CENTRAL ARKANSAS NATIONAL WILDLIFE REFUGE COMPLEX

Bald Knob, Big Lake, Cache River, and Wapanocca National Wildlife Refuges

DRAFT COMPREHENSIVE CONSERVATION PLAN AND ENVIRONMENTAL ASSESSMENT

U.S. Department of the Interior
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Executive Summary

INTRODUCTION

The U.S. Fish and Wildlife Service (Service) has prepared this Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) to guide the management of the four refuges within the Central Arkansas National Wildlife Refuge Complex (Complex). The four refuges in the Complex include Bald Knob, Big Lake, Cache River, and Wapanocca. The Draft CCP/EA outlines programs and corresponding resource needs for the next 15 years, as mandated by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act).

PLANNING PROCESS

The Service began a pre-planning stage with biological and public use reviews of the refuges' management programs. The biological review team was composed of biologists from federal and state agencies and non-governmental organizations that have an interest in the refuges. These diverse teams presented the Service with management recommendations regarding habitat, wildlife, and refuge resources (e.g., oil and gas), cultural resources, refuge administration, and visitor services. The Service held numerous public meetings to determine issues and solicit public comment on the proposed draft alternatives. All input received from the public during the planning process was carefully considered during the development of this Draft CCP/EA.

ALTERNATIVES

A planning team comprised of Service personnel, state agency representatives, non-governmental organizations, and others developed the EA, formulating and analyzing a range of alternatives, or different approaches, for refuge management that the Service would reasonably undertake to achieve the goals and fulfill the purposes of the refuges. Each alternative consists of different sets of goals, objectives, and strategies for management of the refuge. Three possible management alternatives emerged for evaluation and are discussed below.

Alternative A – Current Management (No Action Alternative)

Under Alternative A, the "no action" alternative, management on the Central Arkansas NWR Complex would not change from the current action and direction. The refuges would expand where possible within their approved acquisition boundaries.

The refuges would continue to restore, protect, and manage habitat as follows:

- Bottomland hardwood forest
- Wetlands
- Cropland units
- Moist-soil units
- Wilderness (Big Lake NWR only)
- Open water
- Grassland/Scrub-shrub habitats

Management would continue to focus on:

- Conservation of wildlife habitat through land acquisition from willing sellers
- Enhancing forest habitat
- Afforestation and reforestation
- Restoration of wetlands
- Invasive plant and nuisance animal management
- Cooperative farming
- Inventorying and monitoring
- Priority public uses (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and Interpretation)

Alternative B – Minimal Management

Under this alternative, no active habitat management would occur. The Service would implement a passive approach to management of habitats and monitor "natural" succession and wildlife populations. This would entail moderate to major adverse impacts on use of the Refuge by waterfowl and other water associated and dependent species as a result of declining habitat quality and quantity. Public use opportunities would diminish as a result of decreased opportunities for observation, hunting, and fishing.

Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)

Under this alternative, habitat conservation and subsequent restoration would continue through land acquisition projects from willing sellers, but with increased capability. Additionally, the refuges would intensify and expand forest, moist-soil, scrub-shrub, and grassland management programs in order to increase benefits for waterfowl, shorebirds, water birds, other migratory birds, and other species of native wildlife. Hydrologic, wetland, and forest restoration projects also would be expanded. Invasive plant and animal control projects likewise would be increased. A full range of inventorying, monitoring, and research programs would be developed and implemented to enable adaptive management. Environmental education and interpretive programs would be improved; opportunities for hunting, fishing, and wildlife observation would be expanded; and law enforcement coverage would be increased for more effective protection of resources and visitors. Additional staff would be hired, additional equipment would be acquired, and improved facilities would be installed to enable implementation of these expanded projects and programs.

SELECTION OF ALTERNATIVE

The planning team's proposed alternative, Alternative C, was selected by the Service as the basis for the Draft CCP/EA and is the most reasonable alternative to best achieve each refuge's purposes, vision, and goals over the next 15 years.

SECTION A. DRAFT COMPREHENSIVE CONSERVATION PLAN

I. Background

INTRODUCTION

This Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for the Central Arkansas National Wildlife Refuge Complex (Complex), which includes the refuges of Bald Knob, Big Lake, Cache River, and Wapanocca, was prepared to guide management actions and direction for the refuges over the next 15 years. Fish and wildlife conservation will receive first priority in management of the refuges, while wildlife-dependent recreation will be allowed and encouraged as long as it is compatible with, and does not detract from, the mission of the National Wildlife Refuge System (Refuge System) or the purposes for which they were established.

A planning team comprised of Fish and Wildlife Service (Service) personnel, state wildlife agency representatives, non-governmental organizations, and others developed a range of alternatives for refuge management that the Service could reasonably undertake to achieve the goals and fulfill the purposes for each refuge in the Complex. This Draft CCP/EA describes the proposed alternative, as well as other proposed alternatives that were considered and their effects on the environment. Each alternative consisted of different sets of goals, objectives, and strategies for management of the refuges.

The Draft CCP/EA will be made available to state and federal government agencies, conservation partners, and the general public for review and comment. Comments from each entity will be carefully considered in the development of the final CCP.

PURPOSE AND NEED FOR PLAN

The purpose of the CCP is to ensure that each refuge contributes to the Refuge System's mission to provide a 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.

Specifically, the CCP is needed to:

- provide a clear statement of management direction for the refuges;
- provide refuge 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, recreation, and education programs, are consistent with the mandates of the Refuge System;
- ensure that refuge management is consistent with the purposes for which the refuges were established;
- ensure that refuge management is consistent with federal, state, and local plans and contributes to the Service's ecosystem management goals for the ecosystem in which the refuges are located; and

- provide a basis for the development of budget requests for operations, maintenance, and capital improvement needs.

FISH AND WILDLIFE SERVICE

The Fish and Wildlife Service is the primary rederal agency responsible for conserving, protecting, and enhancing the Nation's fish and wildlife resources and their habitats. The mission of the Service is "working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people."

Responsibilities are shared with other federal, state, tribal, and local entities; however, the Service has specific responsibilities for endangered species, migratory birds, inter-jurisdictional fish, and certain marine mammals, as well as for lands and waters administered by the Service for the management and protection of these resources. It also operates national fish hatcheries, fishery resource offices, and 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, such as wetlands; and helps foreign governments with their conservation efforts. It also oversees the Federal Aid Program that distributes hundreds of millions of dollars from 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 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 Service manages the 95-million-acre National Wildlife Refuge System, which encompasses over 545 national wildlife refuges, thousands of small wetlands, and other special management areas. The majority of these lands, 77 million acres, is in Alaska, with the remaining acres located among the other 49 States and several territories. Approximately 82 million acres in the Refuge System were reserved from the public domain. The remainder was acquired through purchase, from other federal agencies, as gifts, or through easement and lease agreements.

LEGAL POLICY CONTEXT

The mission and goals of the Refuge System, congressional legislation, presidential executive orders, and international treaties guide administration of national wildlife refuges. Policies for management options of refuges are defined in 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.

NATIONAL WILDLIFE REFUGE SYSTEM IMPROVEMENT ACT OF 1997

An important milestone occurred in 1997, with the passage of the National Wildlife Refuge System Improvement Act (Improvement Act), which has been called the "Organic Act" of the Refuge System. The Improvement Act established, for the first time, a clear legislative mission of wildlife conservation for the Refuge System.

The Improvement Act also recognized the outstanding recreational opportunities on refuges. The Refuge System has long provided some of the Nation's best hunting and fishing, and our refuges continue to support these deeply rooted American traditions. The law identified and established compatible wildlife-dependent recreation (e.g., hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation) as priority public uses of the Refuge System. Among other things, this far-reaching law required comprehensive conservation planning for each refuge, and set standards to assure that all uses of refuges are compatible with their purposes and the Refuge System's wildlife conservation mission. It also required the Service to conserve the biological integrity, diversity, and environmental health of refuges, and consider the conservation of the ecosystems of the United States, while planning the growth of the Refuge System.

The Service's planning process is premised on strong partnerships with state fish and wildlife agencies. It provides an opportunity to use sound science in managing refuges, thereby assuring an ecological perspective of how refuges fit into the greater surrounding landscapes. The planning process also provides citizens with a meaningful role in shaping the future management of refuges and recognizes the important role that refuges play in the lives of nearby communities.

The Improvement Act states that each refuge shall be managed to:

- fulfill the mission of the Refuge System;
- fulfill the individual purpose(s) of each refuge;
- consider the needs of wildlife first;
- fulfill requirements of comprehensive conservation plans that are prepared for each unit of the Refuge System;
- maintain the biological integrity, diversity, and environmental health of the Refuge System;
- recognize that wildlife-dependent recreation activities, including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation, are legitimate and priority public uses; and
- allow refuge managers authority to determine compatible public uses.

NATIONAL AND INTERNATIONAL CONSERVATION PRIORITIES AND INITIATIVES

Conservation priorities for national wildlife refuges in the Lower Mississippi Valley focus on threatened and endangered species, trust species, and species of local concern. Goals and objectives in this Draft CCP are stepped down from the following plans:

- North American Waterfowl Management Plan;
- Partners in Flight Bird Conservation Plan;
- North American Bird Conservation Initiative;
- United States Shorebird Conservation Plan;

- Fisheries Vision for the Future;

- American Woodcock Management Plan.

NORTH AMERICAN WATERFOWL MANAGEMENT PLAN

The North American Waterfowl Management Plan (NAWMP), signed by the United States and Canadian governments in 1986, undertook an intensive effort to protect and restore North America's waterfowl populations and their habitats. With its update in 1994, Mexico became a signatory to the plan. Restoration of wetlands and associated ecosystems is the main premise of the plan in order to restore waterfowl populations to levels observed in the 1970s.

Refuges within the Complex provide important foraging and resting habitats (e.g., sanctuaries) for waterfowl and serve an integral role in a large, cooperative planning and habitat management effort.

PARTNERS IN FLIGHT BIRD CONSERVATION PLAN

The National Fish and Wildlife Foundation led efforts in the 1990s to form the Partners in Flight program that combines resources and knowledge to protect the natural diversity of our continent. Many partners have made the program successful by participating in Working Groups to develop Regional Bird Conservation Plans that set conservation priorities and habitat and population objectives.

The Complex's refuges are located within Physiographic Area 5 and can contribute to the plan's actions for restoration projects to benefit migratory landbirds. Habitats found on the refuges and those associated bird focal species that use them are:

- Bottomland hardwood forests – Ivory-billed Woodpecker, Swallow-tailed Kite, Swainson's Warbler, Cerulean Warbler, Prothonotary Warbler, and Northern Parula;

- Secondary growth – Painted Bunting and Bell's Vireo;

- Moist-soils and croplands – shorebirds and waterfowl.

NORTH AMERICAN BIRD CONSERVATION INITIATIVE

This initiative is a broad coalition of governmental, non-governmental, and academic organizations interested in coordinating efforts to conserve bird populations and the landscapes upon which they depend. It evolved in 1998, when conservationists recognized the value of coordinating and integrating planning, implementation, and evaluation efforts associated with the North American Waterfowl Management Plan, Partners in Flight, U.S. Shorebird Conservation Plan, and the Northern American Waterbird Conservation Plan.

UNITED STATES SHOREBIRD CONSERVATION PLAN

The United States Shorebird Conservation Plan is a partnership involving organizations throughout the United States committed to the conservation of shorebirds. Primary objectives of this plan are to:

- develop a scientifically sound monitoring system to provide practical information to researchers and land managers;

- identify principles upon which management plans can integrate shorebird habitat conservation with multiple species strategies;

- design a strategy for increasing public awareness and information concerning wetlands and shorebirds.

The refuges within the Complex are included in the Lower Mississippi/Western Gulf Coast Shorebird Region. The plan recommends that public lands provide as much fall shorebird habitat as possible to meet the goal of 5,000 acres of fall habitat in Arkansas. In this plan, bird species that should be considered a high priority for the refuges include: Piping Plover, American Golden-plover, Marbled Godwit, Ruddy Turnstone, Red Knot, Sanderling, Buff-breasted Sandpiper, American Woodcock, and Wilson's Phalarope.

FISHERIES VISION FOR THE FUTURE

In 2001, the Service worked with partners to refocus its Fisheries Program and develop a vision. This vision of the Service and its Fisheries Program is "*working with partners to restore and maintain fish and other aquatic resources at self-sustaining levels and to support Federal mitigation programs for the benefit of the American public."*

To achieve the vision, the Fisheries Program works with its partners to:

- protect the health of aquatic habitats;

- restore fish and other aquatic resources; and

- provide opportunities to enjoy the benefits of healthy aquatic resources.

AMERICAN WOODCOCK MANAGEMENT PLAN

The American Woodcock Management Plan sets management goals to restore woodcock population to levels consistent with the demands of consumptive and non-consumptive users (U.S. Fish and Wildlife Service 1990). Reliable annual population estimates, harvest estimates, and information on recruitment and distribution are essential for comprehensive woodcock management, as well as conserving and managing habitat. No step-down management plans have been written, but the plan provides general guidance for habitat and population management at the national level.

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 (Hunter and Golder, In prep). A key objective of this plan is the standardization of data collection efforts to better recommend effective conservation measures.

RELATIONSHIP TO STATE WILDLIFE AGENCY

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

The Arkansas Game and Fish Commission (AGFC) is the state fish and wildlife agency partnering with the Service. The AGFC plays an important role in keeping “The Natural State” true to its title. The agency is responsible for the protection, conservation, and preservation of fish and wildlife in Arkansas. This is done through habitat management, fish stocking, hunting and fishing regulations, and a host of other programs conducive to helping Arkansas’ wildlife flourish. The AGFC manages over 280,000 acres of state-owned natural areas and wildlife management areas.

The state’s participation and contribution throughout this planning process provides for open dialogue with the Service and continued opportunity to improve the ecological health and diversity of fish and wildlife in Arkansas. A vital part of the planning process is integrating common mission objectives, where appropriate.

II. Refuge Overview

INTRODUCTION

REFUGE HISTORY AND PURPOSE

The Central Arkansas National Wildlife Refuge Complex is comprised of four refuges: Bald Knob, Big Lake, Cache River and Wapanocca, in east and central Arkansas (Figure 1). The Complex is supervised by a project leader and assisted by other staff located at the Cache River NWR. Additionally, each refuge has specific staff stationed on site.

BALD KNOB NATIONAL WILDLIFE REFUGE

Bald Knob NWR, located near the small town of Bald Knob in White County, Arkansas, was established in 1993, to protect and provide feeding and resting areas for migrating waterfowl. The Service's Final Environmental Assessment and land protection plan for the refuge stated the purpose for acquisition *"is for preservation of winter habitat for lesser-snow geese, Canada geese, mallards, pintail, blue-winged teal and wood ducks."* Annually, the refuge hosts the largest populations of wintering pintail in the state and is a crucial staging area for pintail migrating to the coastal areas of Louisiana and eastern Texas.

The refuge encompasses more than 15,000 acres of forested wetlands and croplands, located along the Little Red River and adjacent to the AGFC Henry Gray/Hurricane Lake Wildlife Management Area. Most of the refuge is flat or characterized by gentle ridges and swales. The refuge is an important link in protecting wildlife and habitat. One unit of the refuge is situated 3 miles west of the confluence of the Little Red River and the White River. These rivers are key water sources for the refuge.

Management activities on the refuge include cooperative farming to provide high energy foods (e.g., rice, milo, and millet for migratory birds), moist-soil development, installing and maintaining water control structures, restoration of bottomland hardwood forests, and providing compatible wildlife-dependent recreation.

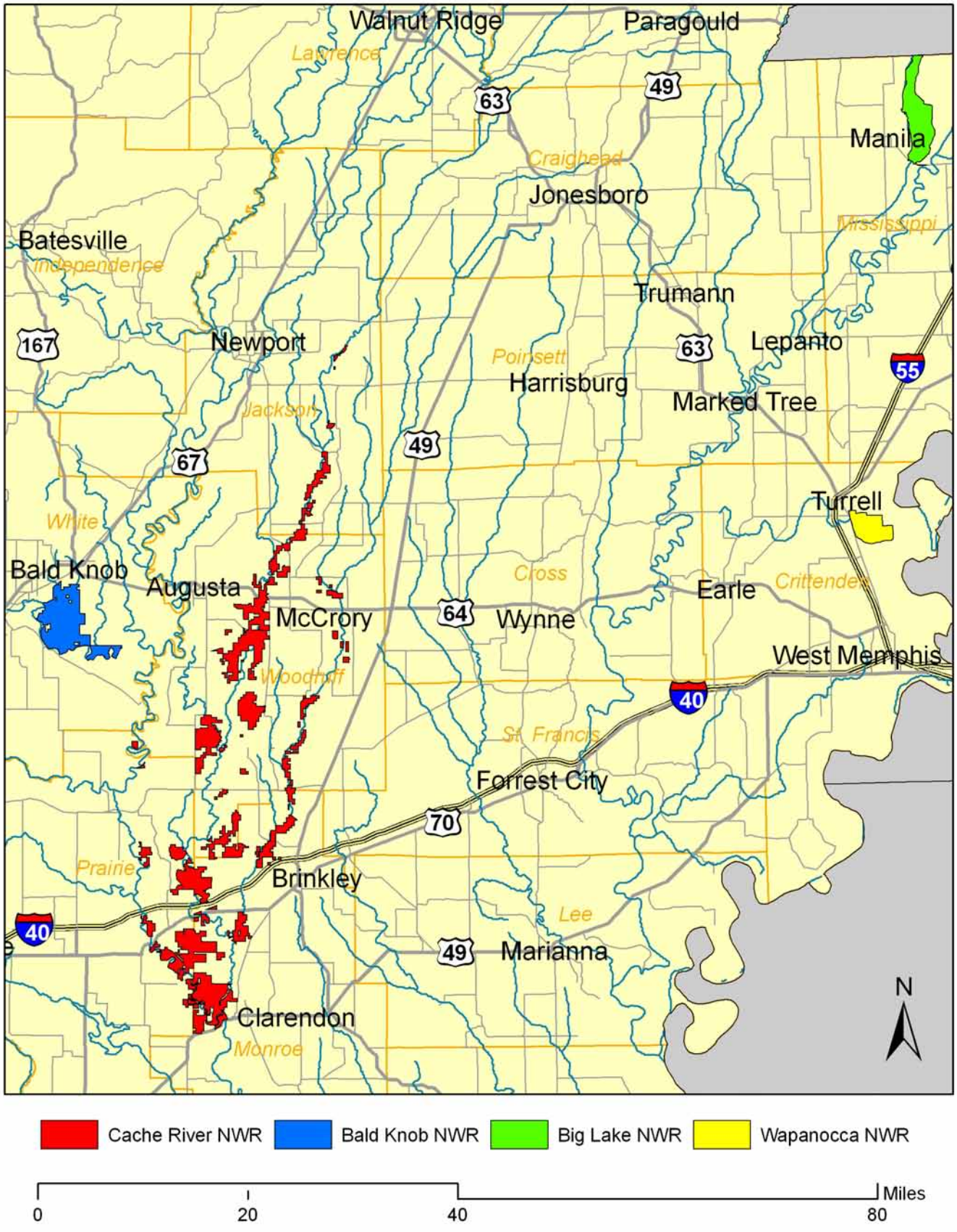
Bald Knob NWR's official purposes are:

"…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. 3901(b) (Emergency Wetlands Resources Act of 1986).

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

"…for use as an inviolate sanctuary, or for any other management purposes, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act).

Figure 1. Central Arkansas NWR Complex



BIG LAKE NATIONAL WILDLIFE REFUGE

Big Lake NWR, located near the town of Manila in Mississippi County, Arkansas, was established in August 1915, by Executive Order of President Woodrow Wilson to serve as a reserve and breeding ground for native birds. It is one of the Nation's oldest inland refuges and encompasses 11,038 acres. The New Madrid earthquakes of 1811 – 1812 changed the Big Lake area from a free-flowing river system to its present lake/swamp environment. An extensive network of ditches in the Missouri bootheel drains approximately 2,500 square miles of farmland directly through the refuge.

Big Lake NWR also administers two Farm Service Agency tracts and one conservation easement. The French Tract is located in Greene and Lawrence Counties and contains 108 acres. The French easement is also located in Greene County and encompasses 18 acres. The Craighead County tract contains 42 acres and is located in Craighead County.

Management activities target water, waterfowl, wetland, forestry, wilderness stewardship, and compatible wildlife-dependent recreation.

Big Lake NWR's official purposes are:

"…as a refuge, reserve, and breeding ground for native birds" (Executive Order 2230, dated August 2, 1915).

"…for use as an inviolate sanctuary, or for any other management purposes, for migratory birds. " 16 U.S.C. 715d (Migratory Bird Conservation Act).

To manage the Big Lake Wilderness as part of the National Wilderness Preservation System according to the Wilderness Act of 1964, as compatible with the purposes for which Big Lake NWR was established.

CACHE RIVER NATIONAL WILDLIFE REFUGE

Cache River NWR, located in Jackson, Monroe, Prairie, and Woodruff Counties, in central Arkansas, was established on June 16, 1986, with the purchase of 1,395 acres. Land acquisition has continued on a willing-seller basis, and the refuge now includes more than 65,000 acres. The approved land acquisition boundary of 185,574 acres is defined as lands within the 10-year floodplain of the lower and middle Cache River Basin, including Bayou DeView.

The establishment of Cache River NWR exemplifies the Service's commitment to conserve and restore bottomland hardwood habitat in the Mississippi Alluvial Valley (MAV). The refuge features some of the largest remaining tracts of bottomland hardwood forest within the MAV. This unique complex of wetlands provides critical wintering habitat for waterfowl and other migratory and resident wildlife species.

Management activities focus on water, waterfowl, wetland, cropland and forestry programs, and providing compatible wildlife-dependent recreation.

Cache River NWR's official purposes are:

"…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. 3901(b) (Emergency Wetlands Resources Act of 1986).

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

"…for use as an inviolate sanctuary, or for any other management purposes, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act).

WAPANOCCA NATIONAL WILDLIFE REFUGE

Wapanocca NWR was established on January 24, 1961, with the leasing of 3,119 acres from the Wapanocca Outing Club. On January 1, 1966, another 1,695 acres was added to the refuge. Currently, the refuge totals 5,620 acres and is located 20 miles northwest of Memphis, Tennessee, in Crittendon County, Arkansas.

The refuge also administers two Farm Service Agency fee title tracts in St. Francis County. The Round Pond Unit contains 480 acres and the Pigmon Unit contains over 29 acres.

Wapanocca Lake is an oxbow lake formed when the Mississippi main channel changed its course. Subsequent flooding has deposited 5 to 6 feet of silt, creating what is now a shallow lake system. The refuge now remains as an island of wildlife habitat amidst a sea of agriculture. Habitat diversity includes agricultural land, grassland, bottomland hardwood forest, and flooded cypress/willow swamp.

The refuge provides a wintering area for migratory waterfowl, a nesting habitat for resident wood ducks, and as a link in the chain of refuges along the Mississippi River to accommodate the southward migration of Canada geese.

Management activities include water, waterfowl, wetland, cropland and forestry management, and providing compatible wildlife-dependent recreation.

Wapanocca NWR's official purpose is:

"…for use as an inviolate sanctuary, or for any other management purposes, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act).

SPECIAL DESIGNATIONS

Bald Knob NWR has been named as an "Important Birding Area" by the Audubon Arkansas Board of Directors.

Big Lake NWR contains about 5,000 acres of lands designated as a National Natural Landmark Area in the mid-1970s. The tract includes seasonally flooded bottomlands, open water, and permanently flooded swamplands. Pure stands of bald cypress, the only significant stands of virgin timber in the area, dominate the overstory species. A mixture of white ash, tupelo, and some scattered oaks also occur in the forested areas. A 2,144-acre tract within the National Natural Landmark Area was designated as a Wilderness Area. The American Bird Conservancy also has listed the refuge as a Globally Important Bird Area.

Cache River NWR was designated as a "Wetland of International Importance" in 1989, under the auspices of the "Convention on Wetlands of International Importance Especially as Waterfowl Habitat," commonly referred to as the Ramsar Convention. The Convention criteria, under which

these lands qualified as the eighth U.S. Wetlands of International Importance, were: (1) Volume of use by migratory and resident waterfowl, especially mallards; (2) outstanding example of a wetland community characteristic of its bio-geographic region; (3) endangered species; (4) species diversity; (5) research value; and (6) practicality of conservation and management (AGFC 1989).

The Cache River Natural Area, dedicated by the Arkansas Natural Heritage Commission in 1982, is a 937-acre area located within the AGFC Rex Hancock/Black Swamp Wildlife Management Area, which is intermingled with tracts of the Cache River NWR. This Natural Area contains outstanding examples of cypress-tupelo swamp and willow oak forest. Cypress trees in this and several other locations within the ecosystem are estimated to be in excess of 500-1,000 years old by University of Arkansas dendrochronological research (e.g., Stahle et al., 1985).

Wapanocca NWR was named as a Continentally Important Bird Area by the American Bird Conservancy because of its significant numbers of herons and waterfowl.

ECOSYSTEM CONTEXT

OVERVIEW

The Service is increasing its efforts, within the ecosystem management context, to adopt collaborative resource partnerships with private landowners and local communities, as well as state and federal governments. The purpose is to reduce the declining trend of fish and wildlife populations and biological diversity, to establish conservation priorities, to clarify goals, and to solve common threats and problems associated with fish and wildlife resources. The synergy of unified efforts of federal, state, tribal, and private organizations will ensure that the more important habitat areas are protected and that redundancy and overlap in conservation efforts are avoided.

The refuges within the Complex are members and active participants of the Service's Lower Mississippi River Ecosystem Team (Figure 2). The Lower Mississippi River Ecosystem (LMRE) is the primary wintering habitat for mid-continent waterfowl populations, as well as breeding and migrating habitat for songbirds returning from Central and South America, while providing high-quality habitat for resident wildlife species.

Geographically, the refuges lie on the northwestern boundary of the LMRE. The refuges have opportunities to contribute to many of the goals and objectives established for the protection and management of the LMRE.

LOWER MISSISSIPPI RIVER ECOSYSTEM PRIORITIES

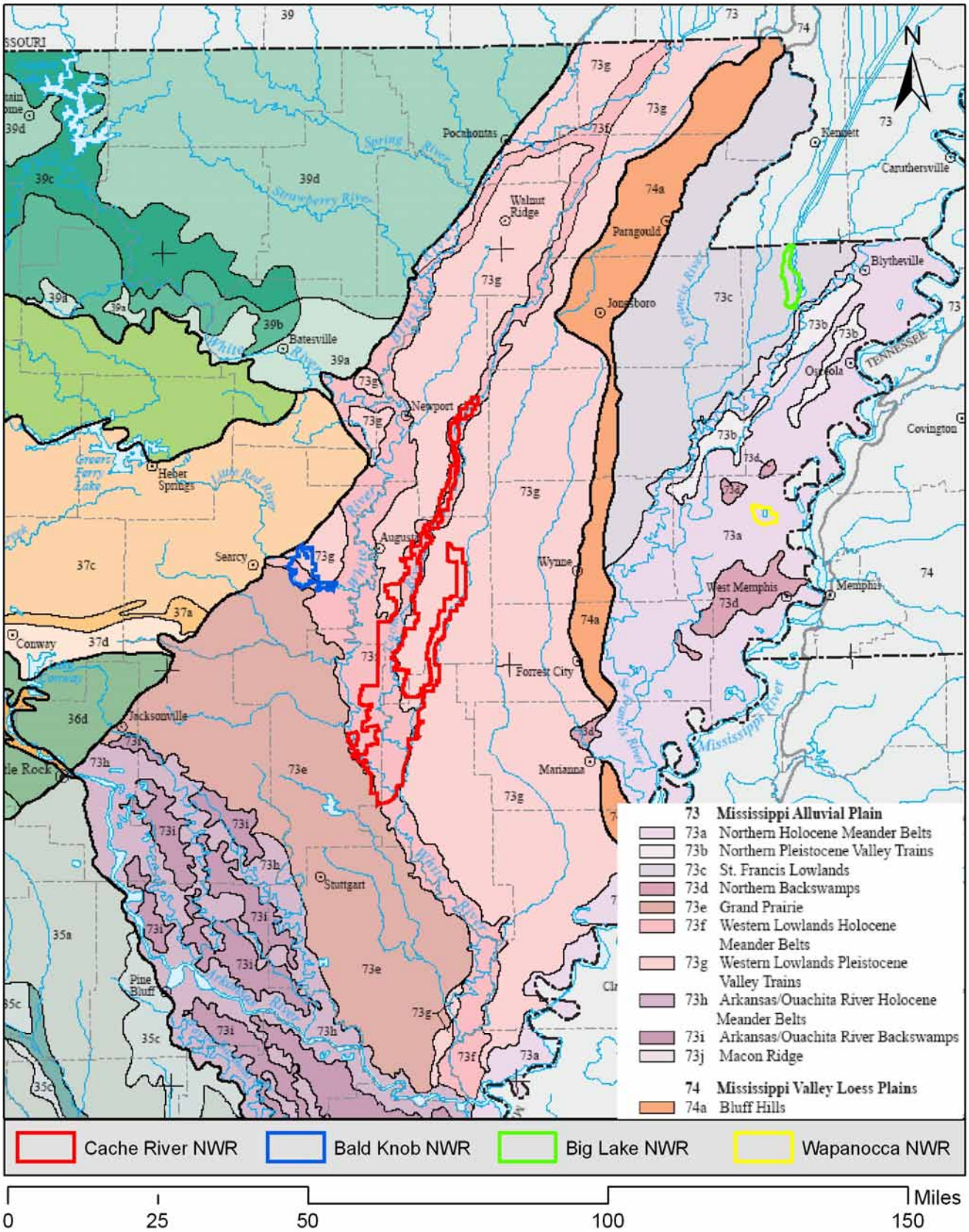
Goals identified by the Lower Mississippi River Ecosystem Team to which the refuges can contribute include:

Goal 1. Conserve, enhance, protect, and monitor migratory bird populations and their habitats in the LMRE.

Goal 2. Protect, restore, and manage the wetlands of the LMRE.

Goal 3. Protect and/or restore imperiled habitats and viable populations of all threatened, endangered, and candidate species and species of concern in the LMRE.

Figure 2. Location of Central Arkansas NWR Complex in the LMRE



Goal 4. Protect, restore, and manage the fisheries and other aquatic resources historically associated with the wetlands and waters of the LMRE.

Goal 5. Restore, manage, and protect national wildlife refuges and national fish hatcheries.

Goal 6. Increase public awareness and support for LMRE resources and their management.

Goal 7. Enforce natural resource laws.

Goal 8. Protect, restore, and enhance water and air quality throughout the LMRE.

REGIONAL CONSERVATION PLANS AND INITIATIVES

THE BIG WOODS OF ARKANSAS

The Nature Conservancy and its partners, including the Service, have protected more than 120,000 acres in the Big Woods of Arkansas, a 550,000-acre corridor of floodplain forest along the Mississippi River. Some of the corridor includes Refuge System lands. In 2004, the Ivory-billed Woodpecker, thought to be extinct, was re-discovered within the corridor. Major restoration and conservation priorities for the Big Woods have been identified. Efforts by the Conservancy, the Service, the Arkansas Natural Heritage Commission, the AGFC, and others continue to focus on these ecologically important lands.

ARKANSAS WILDLIFE ACTION PLAN

Each state, including Arkansas, has developed a wildlife action plan to determine comprehensive wildlife conservation strategies for flora and fauna within the state. The plan identified 18 categories of threats to the wildlife of Arkansas, the condition of the state's wildlife health, and determined associated management actions needed to conserve wildlife and important habitat before they become more rare and costly to protect. Many of these threats are also of concern to the Service, such as hydrological alteration, habitat destruction, contaminants, predation and disease, and resource depletion. The Service and the AGFC work cooperatively on many projects to combat the effects of these threats.

ECOLOGICAL THREATS AND PROBLEMS

National wildlife refuges in the Lower Mississippi Valley (LMV) serve as part of the last safety net to support biological diversity, the greatest conservation challenge facing the Service. According to the LMRE Team, the greatest threats to biological diversity within the LMV are:

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

- the cumulative habitat effects of land and water resource development activities.

Specific threats applicable to Complex include:

- altered hydrology, stream flows, and flooding regimes, and reduced water quality;
- colonization of invasive plant and animal species, which displace natural vegetation and degrade those habitats on which native animal species depend;
- loss of freshwater source for Wapanocca Lake;
- deposition of sediment, trash, and pollutants resulting from flood events in the Missouri bootheel into Big Lake, and
- potential on-site impacts of off-site oil and gas development.

CLIMATE

The climate of central and eastern Arkansas can be characterized as mild and moderately humid. The mean monthly minimum temperature at Stuttgart is 39.7ºF in January, and the mean monthly maximum is 91.1ºF in July. Winters are relatively mild, but brief cold periods occur occasionally. The region has a long growing season, ranging from approximately 200 days in the north to 220 days in the south, and extended hot, humid periods are common during the summer, with maximum temperatures often exceeding 100ºF during July and August.

The region receives abundant precipitation, ranging from 48 to 51 inches annually. Although rainfall is considered to be well distributed throughout the year (the average number of days with measurable precipitation is about 100 per year), there is a pronounced seasonal pattern. Almost one-third of the annual rainfall occurs during March, April, and May, with the driest months being July through October. The average annual evaporation is about 37 inches, with approximately 23 inches occurring from May through September, which exceeds the average rainfall during this period by about 5 inches. The average annual runoff throughout this region is 16 to 20 inches, most occurring from November through April (Friewald 1985). These climatic characteristics are important in driving the hydrology of the watershed, which is in turn the most critical component in shaping ecosystem functions and processes.

Geology and Topography

Geology and topography for the Cache River NWR is representative of all four refuges within the Central Arkansas NWR Complex. Specific details regarding Bald Knob, Big Lake, and Wapanocca NWRs can be requested from each refuge. The discussion below will give the reader a general sense of the geology and topography for all the refuges within the Complex.

An understanding of the basic geology of Arkansas' Delta is important for understanding the interrelationships of the soil and hydrologic components and processes of the ecosystem, which provide the basis for the associated biotic communities. Paleozoic bedrock outcrops occur on the western edge of the Delta, and declines to the southeast, where outcrops are overlain by more recent alluvial and loessal strata deposited during alternating inundations and recessions of the Gulf of Mexico. The bedrock below the Cache/Lower White Rivers' system originated nearly 1,000 to over 4,000 feet below sea level. Various overlying strata of gravel and sand support several important and productive aquifers, alternating with confining strata of silts and clays (ASWCC 1988).

The surface strata of the Cache/Lower White Rivers' basin are all Quaternary deposits of alluvium and loess. Holocene alluvial deposits of the existing major rivers, abandoned meanders, and areas near channels form the current "bottomland" areas. These are the lowest areas in the basin, and most likely to be forested and retain other obvious wetland characteristics. Immediately upslope of these most recent deposits are one or more terraces of Pleistocene alluvial deposits. Lands at this and higher elevations are the ones which have largely been cleared for agricultural production. Older deposits are exposed in only very limited circumstances in the basin. These include an area of dune sand located in Woodruff County between the Cache River and Bayou DeView, and some isolated pockets of exposed silt and sand along Bayou DeView north and east of Jonesboro.

The elevation at the north end of the basin at the Missouri state line is approximately 300' mean sea level (MSL), compared to 125' MSL at the mouth of the White River. This drop in elevation across 185 air miles represents an average slope of only 0.018 percent (approximately 1 ft/1 mi) across the entire basin. Although relatively flat, the topography of the basin can be somewhat complex, with numerous current stream and river channels, old meanders, and oxbow lakes surrounded by one or more terrace levels or bottoms.

The topography is usually one of three basic types: braided-stream terraces which display a characteristic dendritic drainage pattern; meander belts which contain areas of past or present channel migration with numerous parallel, crescent-shaped ridges and swales; and backswamps, which are flat areas that remained peripheral to channel migration and slowly filled with layers of fine sediments. Thus, in contrast to the apparent "flatness" of the landscape, the subtle complexity resulting from past and ongoing geologic forces has a dramatic and pronounced effect on the processes which drive this ecosystem and its functions. These processes in turn dictate the complexity of associated biologic communities that evolved here.

SOILS

A casual examination of any of the county soil surveys for the basin provides further visual reinforcement of the inherent complexity of the system. The majority of the soil types in the basin are hydric, and the spatial relationships of the various soil types and associations present further evidence of their fluvial origin and influence. By and large, the soils of the basin are rich and fertile, and thus the reason for draining and clearing of most of the original forests for agricultural production. Most of the soils have a high clay content, which results in their capability to perch water at the surface, but this also prevents most areas from contributing to significant groundwater recharge through infiltration. These soil characteristics allow the make cultivation of rice over a significant percentage of the lands in the basin. Where water retention and flooding characteristics of individual soils are not suited to rice, the dominant crops are soybeans, winter wheat, and milo, with minor acreages of corn and cotton occurring on the highest, most well-drained sites. Physiochemical and physiographic characteristics of soils (e.g., high clay content, susceptibility to erosion, water retention capabilities, and compressibility), and their relationships to ongoing hydrologic processes necessitate careful consideration during assessment of potential impacts of management and land use activities, if restoration and conservation of ecosystem functions are to be successful.

HYDROLOGY

Bald Knob and Cache River NWRs

A basic appreciation of the hydrology of the Cache/Lower White Rivers' ecosystem, and recognition and acknowledgement of its importance as the driving force behind all other ecosystem processes and functions is fundamental to addressing long-term conservation. Without this explicit recognition

by all partners, effective long-term management of public lands within the basin is impossible, and efforts toward meaningful, sustainable restoration of ecosystem functions cannot be effective or adequately focused. Although a thorough understanding and comparison of the past and present hydrologic function of the system would be desirable, available data are inadequate. However, the basic concepts and generalizations which are known can contribute significantly to providing context and direction to management of the public lands within the ecosystem, and to addressing the influence of the surrounding agricultural landscape.

Pre-settlement Conditions – The Cache/Lower White Rivers' ecosystem was a forested wetland habitat complex whose composition, structure, and function were largely determined by the frequency, duration, and depth of inundation. The Cache River drainage area is 1,037 mi^2 and that of Bayou DeView is 421 mi^2. The abundant annual rainfall, flat topographic profile, and other hydrologic influences resulted in flooding, which ranged from frequent, deep, and prolonged events adjacent to the major drainages and in the lower portion of the system, to shallow and temporary events in the topographically higher areas of the bottoms and in isolated, but often extensive depressions throughout the terrace lands. The annual hydrologic cycle reflected seasonal rainfall patterns, with lowest flows occurring in July through October, and flooding along the river bottoms typically beginning in December or January and peaking in February and March on the Cache River and Bayou DeView and in April and May on the lower White River (ASWCC 1988). The system contained an abundance of stream channels, sloughs, oxbow lakes, and scrub-shrub swamps, which contained water throughout the year in all but the driest years. Extremely dry periods, during which a significant percentage of the smaller stream channels (on the order of Cache River and smaller) were exposed, were infrequent but must have occurred every few hundred years as evidenced by (1) the current distribution of bald cypress, which can survive but not germinate in inundated circumstances, and (2) documentation through a 400+ year-flow reconstruction based on a dendrochronological study of old-growth bald cypress trees on the Cache River (Cleaveland et al., 1988). The extreme dynamism of the hydrology within the system, over both the short- and long-term, was one of its most important pre-settlement characteristics.

There also was and is a significant degree of spatial variation in the hydrology within the ecosystem. Relatively shallow depressions in the bottomlands and terraces are the first areas to be annually influenced by inundation through a process termed "puddling," when they gradually fill during the onset of fall rains in November. With continuing rainfall, these areas expand and interconnect, affecting larger and larger acreages. These depressions would also have been among the last seasonally inundated wetlands to dry during late spring with the end of the rainy period. With the continuation of fall rains, the upper reaches of the streams' floodplains were largely affected by "headwater flooding," the relatively rapid flooding of drainage areas due to heavy rainfalls during short periods of time. Heavy rains, in conjunction with the natural constraints of small channels and broad, vegetated floodplains, can exceed the short-term capacity of the system to carry away the rainfall. As this process proceeded with additional winter and spring rains, gradually pushing major drainages like the White and Mississippi Rivers to capacity, larger areas of flats and floodplains were inundated by "backwater flooding." This was caused by water "backing" into higher areas as a result of flows greatly in excess of stream channel capacities and/or impeded drainage in lower portions of the system. For example, high flows on the Mississippi River greatly affect the hydrology of the lower half of the White River NWR by reducing the ability of the White River to discharge into it; conversely, high flows of the White River may be relatively easily carried if the Mississippi River is low. The same situation exists at the confluence of the Cache and White Rivers at Clarendon, and at other tributary confluences on a smaller scale. Thus, there were complex hydrologic interrelationships between the tributaries and primary rivers within the ecosystem, including the lower White River and Arkansas and Mississippi Rivers.

Hydrologic Modifications – Unfortunately, these hydrologic patterns and relationships and their effects on other functions of the Cache/Lower White Rivers' basin have often been inadequately considered as it has been incrementally but significantly altered since settlement. It is helpful to view the hydrologic alteration of the Cache/Lower White Rivers within the perspective of historic flood control and drainage policies of the MAV as a whole (Baxter and Sunderland 1985). During settlement in the late 1800s and early 1900s, there were many uncoordinated, local flood control and drainage projects. Although these early projects may have had a significant cumulative impact on the terrace lands within the ecosystem, they had less effect on natural headwater and backwater flooding of the major drainages. However, subsequent to the major Mississippi River flood of 1927, when much of the Arkansas Delta was inundated, a comprehensive federal flood control program was initiated. This resulted in the construction of the mainstem Mississippi River levees, and levee projects on major tributaries such as the White River. These projects constricted the floodplains of the Mississippi River and its tributaries such that lower flows now result in higher elevations of flooding than was the case for pre-settlement hydrology. Additionally, headwater dams at Greers Ferry, Bull Shoals, and Norfork were installed as part of the comprehensive federal response to the 1927 floods. Operation of these dams have affected downstream peak flood flows and lowered summer/fall base flows.

One of the byproducts of the subsequent era of major flood control projects was the extensive conversion of bottomland hardwoods to agricultural production, much of it occurring in the Cache/Lower White Rivers' basin during the 1940s through the mid-1970s. Land that was provided protection from flooding by these major levee systems was quickly cleared and brought into agricultural production. Extensive conversion of bottomland hardwood forests to agricultural lands has negatively impacted the hydrological regime of the Cache/Lower White Rivers' basin, as well as the Lower Mississippi Alluvial Valley as a whole. The clearing of forest, increased the "flashiness" of streams due to accelerated run off, and exacerbated siltation in streams and wetland systems due to increased sediment transport. The federal Flood Control Acts of 1944 and 1965 promoted a policy of bottomland hardwood conversion, and the 1965 Act included as a part of its justification the clearing of 4.9 million acres in the MAV (Baxter and Sunderland 1985), much ultimately occurring in the Cache/Lower White River basin. With this federal policy in place, many local drainage/flood control projects, now coordinated to some extent by the U.S. Army Corps of Engineers (COE or Corps), continued up the tributaries through the mid-1980s. Beginning in the early 1900s and continuing until the early 1930s, local drainage districts channelized the upper portion of the Cache River basin, from Grubbs (river mile 128 of 203), at the north end of the Cache River NWR acquisition boundary, to its headwaters. The lower seven miles of the Cache River were also channelized in the early 1970s, but this project was stopped by legal action, and the overall hydrologic impacts of this 7-mile modification are unquantified.

The collective results of over a century of flood control activities has been (1) the draining and clearing of the vast majority of the terrace lands and driest portions of the forested wetland habitats of the entire system, especially within the Cache River/Bayou DeView basin where clearing to the riverbanks has occurred in many areas; (2) constriction of the floodplain of the Lower White River with levees, and the clearing of lands protected by those levees; and (3) the modification of the natural hydrologic patterns (e.g., timing, frequency, and flow rates) throughout the ecosystem. It should be noted that from the biological perspective, these alterations have occurred within a single generation of trees, which constitutes a significant biological alteration. Approximately 85 percent of the basin has been cleared of its hardwoods, and most of these lands were forested wetlands.

A relatively recent and continuing hydrologic modification is the increasing withdrawal of surface water from essentially all available streams for agricultural irrigation. These withdrawals occur at the farm level, are individually relatively small, but are cumulative in their effect throughout the basin. There is no available estimate of current withdrawal rates, but they are known to be collectively substantial. For example, portions of the Cache River, with a relatively low base flow, are frequently

pumped dry for some periods during most summers. Similarly, the upper portion of Bayou DeView usually has no base flow during some summer months, and agricultural pumping has exacerbated this to the point that the stream has recorded no-flow conditions for 10 percent of the time over the last 37 years and has been designated as a "critical surface water area" by the State of Arkansas (ASWCC 1988). However, in contradiction to the previously described long-term effects of flood control and regulation projects, the recent average streamflow of the White River at Clarendon has decreased slightly, and this has been speculated to be the result of current withdrawals for irrigation. Several large-scale irrigation projects, including the Grand Prairie Area Demonstration Project, are being aggressively pursued by the Arkansas Natural Resources Commission, National Resources Conservation Service (NRCS), and Corps, with the White River being the primary source of irrigation.

Current Hydrologic Status – Even though the basic processes of puddling and headwater and backwater flooding still operate within the basin, their collective contribution to hydrologic function has been profoundly modified by both quantitative and qualitative alteration, and by the addition processes such as irrigation withdrawals. Interestingly, the overall hydrologic effects on the system can be described as being at both ends of the spectrum: drier in most areas, wetter in some. The many local efforts directed at drainage associated with agricultural production and transportation (e.g., road ditches) have significantly reduced the area affected by puddling and the amount of water that could be held as a result of puddling. Areas that were cleared of forest and ditched now contribute virtually none of their original hydrologic function to the system by immediately discharging excess rainfall as runoff to the watercourses. When the acreage that has been influenced by flood control projects intended to reduce the impacts of headwater flooding are added to these, then the vast majority of the ecosystem is now affected. This area no longer holds temporary water as it did historically, and now relatively rapidly discharges runoff to the rivers; thus, these areas, comprising most of the higher elevations of the ecosystem, are drier than they were historically, being inundated much less frequently and for much shorter durations.

However, as a direct result of the increased rate of drainage from most of the basin, the lower elevations and those areas nearest the Cache River, Bayou DeView, and White River now receive all this water more rapidly and in quantities more frequently exceeding the capacity of the system to carry and discharge into the Mississippi River. Additionally, the discharge capacity of the White River into the Mississippi River and Cache River into the White River is greatly reduced from historic conditions due to the effects of the levee projects. Thus, the areas immediately adjoining the upper and middle Cache River and Bayou DeView, subjected to unregulated flows, can be characterized as being more frequently flooded at greater depths, but for shorter durations than in the natural ecosystem. The stochastic dynamics of the natural system have in many ways been exaggerated by the hydrologic modifications. On the other hand, the lowest portions of the Cache and Lower White Rivers seem now to be subjected to more frequent flooding, at greater depths, for longer durations than was the historic tendency.

Big Lake NWR

An extensive network of ditches in the Missouri bootheel drains approximately 2,500 square miles directly through Big Lake NWR. The refuge is situated between Ditch 81 and its associated levee to the west and Ditch 28 and its levee to the east.

A Water Management Plan for the refuge establishes operating procedures set forth by the Corps (Memphis District). A 1989 agreement between the Corps and the Service addresses seasonal water level management. Refuge personnel operate five water control structures located in Ditch 81 and Ditch 28 in accordance with guidelines set forth in a Standing Instructions Manual, dated December 1991.

During flood periods the inflows are so heavily laden with silt that an accurate description of the water would be "too thick to drink and too thin to plow." Sediment fallout has provided continual fill to the bottomlands and swamp until there now exists a very shallow lake, averaging only 3 feet in depth. Continued siltation has restricted any aquatic production, and hampered forest growth and development. Under the Water Management Plan, the refuge has served primarily as a sump.

Approximately 15 miles of meandering stream channels run the length of the refuge, but past siltation has made portions of these channels indistinguishable. These channels were once a part of the Little River, but today only a small portion of the original river channel exists just south of the refuge.

Through mutual agreements with regional drainage districts, the Corps, the Service and local interest groups, a plan to improve the situation was implemented to divert some of the silt-laden waters around Big Lake and still provide for adequate inflow to maintain and hopefully improve the area's ecosystem.

Since the implementation of the new regime of water management, water quality has improved, aquatic production has returned, waterfowl populations have become more stable, threatened and endangered species have returned to the area, and recreational interests have increased. Additional water management practices are being explored, which should enhance the refuge's contribution toward the improvements even more.

Despite these improvements, the refuge is still frequently subjected to silt-laden flood waters due to continued drainage projects occurring upstream in Missouri. The frequency of the floods coupled with the silt and drift imported by floods are damaging to the refuge. Geologists from the University of Arkansas took core samples from the bottom of Big Lake in May 1991. Preliminary data from radiocarbon dating revealed that since 1938, more than 3 feet of silt have been deposited into Big Lake. Such siltation rates have greatly accelerated the eutrophication of the Big Lake system.

As long as Big Lake is subjected to the floods from the vast Missouri bootheel agricultural lands, the lake will continue to be filled with Missouri topsoil. Local fishermen complain of lower water levels and aquatic vegetation (e.g., lotus) where none was present 20 years ago. The 2,500-square-mile watershed from the Missouri bootheel provided adequate water supplies during the year. The water was delivered to the head of Big Lake by way of four major drainage ditches. As long as incoming flows were less than 238' msl, refuge personnel manipulated water control structures to create inflows of good quality water into the refuge or to divert poor quality (e.g., muddy) water around the refuge via the diversion canal. When water levels exceeded 238' msl, the refuge operated both the Diversion and North-end structures in the open position to aid in the movement and storage of flood waters as directed in a multi-agency water management agreement.

To provide water for the Hornersville Swamp Wildlife Management Area and the Big Lake Wildlife Management Area waterfowl hunting seasons, the Diversion Channel and North-end structures are operated in a manual mode. As directed in the water management plan, the following elevations immediately upstream of the structure are to be maintained during the specified times:

- Maintain an elevation not to exceed 235.5 National Geodetic Vertical Datum (NGVD) (plus or minus 0.5) from September 15 through October 14.

- Maintain an elevation not to exceed 236.5 NGVD (plus or minus 0.5) from October 15 through October 31.

- Maintain an elevation not to exceed 239.0 NGVD from November 1 through November 15.

- Maintain an elevation not to exceed 236.5 NGVD (plus or minus 0.5) for the remainder of the Arkansas and Missouri winter waterfowl hunting seasons.

When the area receives average fall and winter precipitation, the refuge structures can be operated to easily provide these water levels that will in turn flood the Big Lake WMA to target water levels. The Hornersville Bottoms WMA will have sufficient water for waterfowl hunting when the level is near 239'msl. As a general rule for every inch of rain that falls across the bootheel of Missouri, a foot rise in water at the North-end can be expected within 24 hours. Under flood conditions that generally follow several consecutive rain events, it can be impossible to maintain levels under 238' msl even with all Diversion and North-end gates fully open. During waterfowl hunting season in the Hornersville Bottoms WMA and Big Lake WMA, flooding is usually welcomed as these conditions allow boat access to more areas. With the Big Lake WMA's levee degraded to 237.4'msl in several areas, these high water events are an unwelcome site during the summer growing seasons.

Wapanocca NWR

Wapanocca Lake is an oxbow that was formed when the main channel of the Mississippi River changed its course. Historically, Mississippi River flood events would periodically refresh Wapanocca Lake, but this hydrologic regime was permanently eliminated by the construction of the Mississippi River levee by the Corps, 2.5 miles east of the current refuge boundary. Currently, the only source of water to the lake is from the small watershed between the refuge and the Mississippi River levee. During extreme rain events, ephemeral streams and ditches within the watershed will carry water to Ditch 8, which enters on the east side of the refuge, and can then be diverted into the east end of Woody Pond and eventually into the east end of Wapanocca Lake. However, this process is inadequate to provide a sufficient and timely water source to the lake. Opportunities to input water from Ditch 12 on the North end of Wapanocca Lake are much more frequent, but due to findings of heavy metals within Ditch 12, it is no longer allowed.

Seven drainage ditches (numbers 1, 2, 3, 4, 5, 8, and 13) flow through the refuge. An eighth, number 12, connects with Big Creek and the middle of this ditch is the north boundary of the refuge.

WATER QUALITY AND QUANTITY

Historical data on water quality parameters for the refuges are largely absent. Water quality in pre-settlement times, as in most areas, would be expected to have been good. Water throughout this extensive wetland system, with little erosion except for bank erosion along rivers, would have been anticipated to be relatively clear. In fact, some current long-time residents at the Cache River describe it as being clear as recently as 50 years ago. However, it is apparent that the byproducts of land clearing and subsequent agricultural production on most of the basin's surface area are now driving water quality parameters. The U.S. Geological Survey (1984) cited potential pollution of groundwater and accumulation of pesticides in bottom sediments as a major concern, although it indicated that potential effects were not quantified in eastern Arkansas.

Due to recent (since approximately 1975) water quality monitoring programs of agencies such as Environmental Protection Agency (EPA), U.S. Geological Survey (USGS), and the Arkansas Department of Environmental Quality (ADEQ), there is currently a relative abundance of data (approximately 13 monitoring stations) for the Cache/Lower White Rivers' ecosystem. A USGS trends analysis (Petersen 1990) provides some summary information on some aspects of current water quality trends in the basin in relation to other areas in eastern Arkansas. Typical values of total recoverable manganese and total 2,4-D are higher in the Cache River than any other river group in the region; dieldrin concentrations are highest here along with the St. Francis River; total phosphorus, biochemical oxygen demand, and fecal-

coliform bacteria values are generally higher than most other river groups; and, specific conductance, total alkalinity, and total hardness values are lower than other groups except Bayou Meto. In general, these factors are indicative of a wetland system significantly impacted by agriculture. A 2001 study by North Carolina State University, "Chemical Contamination at National Wildlife Refuges in the Lower Mississippi River Ecosystem," identified some evidence of contaminant hazard associated with organochlorine pesticides and current use pesticides.

Most of the water quality problems of the system are associated directly or indirectly with erosion of sediment from agricultural lands into the streams. Many of the chemical constituents mentioned above are bound to and carried by sediment particles. Turbidity values for Cache River/Bayou DeView were accordingly higher than any other river group in eastern Arkansas (Petersen 1988). Petersen (1988) documented annual suspended sediment discharges at the Patterson and Cotton Plant stations to be 96,800 and 78,500 tons, respectively, in 1987; however, these discharges were not normally distributed over time, with 22 percent of the annual sediment discharge occurring during a 10-day flood event in mid-winter. A study on the Cache River at AGFC Rex Hancock/Black Swamp WMA documented sedimentation accretion rates of up to 2.5 cm/year (Kleiss 1996). In this case, approximately 30 miles of Cache River wetlands were responsible for decreasing the suspended sediment load by an annual average (3 years of data) of 14 percent. However, although sediment retention is a natural function of forested wetlands, this rate of removal of sediment is unnatural and unsustainable over time if maintenance or restoration of wetland functions and values is desirable. This point is supported by dendrogeomorphic analyses, which indicated that historic sedimentation rates in the area may have been as low as 0.01 cm/yr, but that rates increased sharply from less than 0.13 cm/yr immediately prior to 1945 to a mean rate of 0.29 cm/yr from 1981-90 (Hupp and Morris 1990). This significant increase, 30-times greater than estimated natural rates, corresponded with accelerated clearing of forested acreage for agriculture.

BIOLOGICAL RESOURCES

HABITAT

Bald Knob and Cache River NWRs are located within close proximity to one another and have similar habitats. Major forest habitat types for both refuges are depicted in Figure 3.

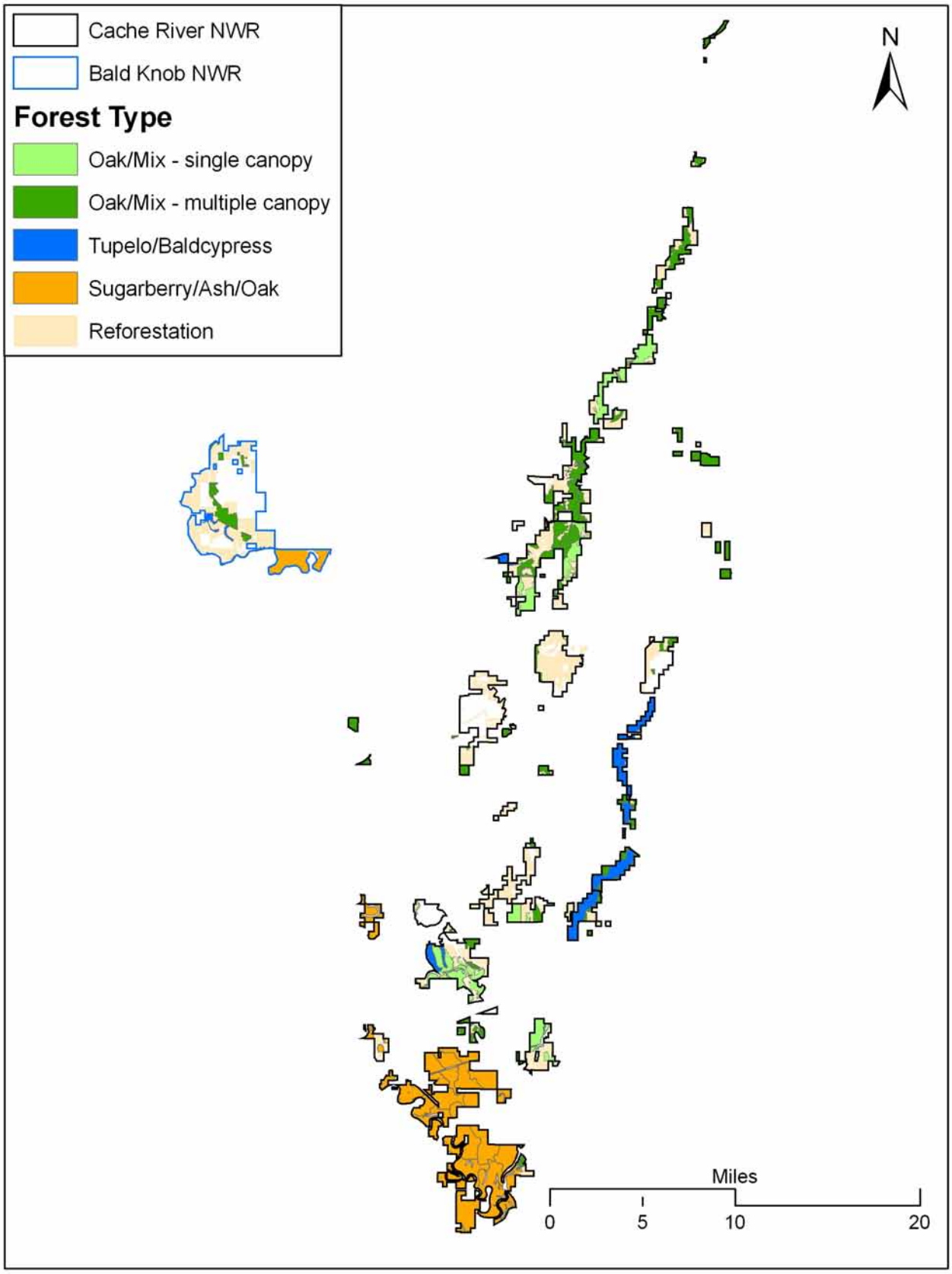
Bald Knob NWR

Habitat/land use types represented on Bald Knob NWR are as follows:

Cropland	4,393 acres
Reforestation	6,188 acres
Bottomland hardwood forest	3,969 acres
Sloughs, ditches and other water	232 acres
Administrative lands	184 acres
Old fields	56 acres

Bounded on the south and east by the Little Red River and characterized by Overflow Creek, which winds through its middle, Bald Knob NWR contains a mixture of cypress-tupelo brakes, oxbow lakes, bottomland hardwoods, recently reforested lands, moist-soil impoundments, and agricultural fields. This variety of habitats supports a tremendous array of plants and animals, particularly migratory birds, throughout the year.

Figure 3. Forest types on Bald Knob and Cache River NWRs



There are now over 16 miles of refuge boundary along the Little Red River. The Mingo Creek Unit lies 3 miles west of the confluence of the Little Red River and the White River. These rivers are key water sources for the refuge, which depends on backwater flooding from the White River, which in turn causes the Little Red River to flood. Precise water management is obtained by cooperative pumping and maintenance agreements within the cooperative farming contract. All water utilized on the refuge is pumped from the Little Red River and is subsequently delivered to individual fields by gravity flow or re-lift pumping.

The refuge was staffed with a manager in 1997 and an engineering equipment operator in 1998. At that time, wildlife management focused on the primary purpose for refuge establishment, which is "conservation of winter habitat for key groups of waterfowl." Management actions involved cooperative farming to provide high energy foods such as rice, milo, and millet for migratory birds via flooding of crops, canal/levee maintenance, creating moist-soil units, repair/construction of water control structures, restoration of bottomland hardwood forests, and initiating compatible public hunt programs.

The recommendation from the 1998 Biological Review to reforest several thousand acres on Bald Knob NWR to provide a corridor that connects the Hurricane Wildlife Management Area and the refuge to the Ozark foothills has been accomplished, and reforestation likely will continue on future inholding purchases. Native oaks, cypress, sweetgum, pecan, and other hardwood species planted in former agricultural fields will greatly enhance habitat diversity for wildlife. In addition, scrub-shrub habitat has increased due to the amount of reforestation that has occurred over the past 10 years. Although the extent of agricultural crops has been reduced from over 10,000 acres in 1995 to 4,393 acres currently, the production of cereal grains, such as rice and milo, continues to provide a critically important food resource for wintering waterfowl. In addition, approximately 1,600 acres of moist-soil impoundments provide seeds and invertebrates for waterfowl, shorebirds, wading birds, and other wetland-dependent wildlife species.

The most unique feature of Bald Knob NWR is the water control infrastructure system available to precisely manage water quantity and depth. Nearly 80 miles of ditches and canals exist and are necessary to effectively drain, irrigate, and flood agricultural and moist-soil habitats to create important wildlife habitat.

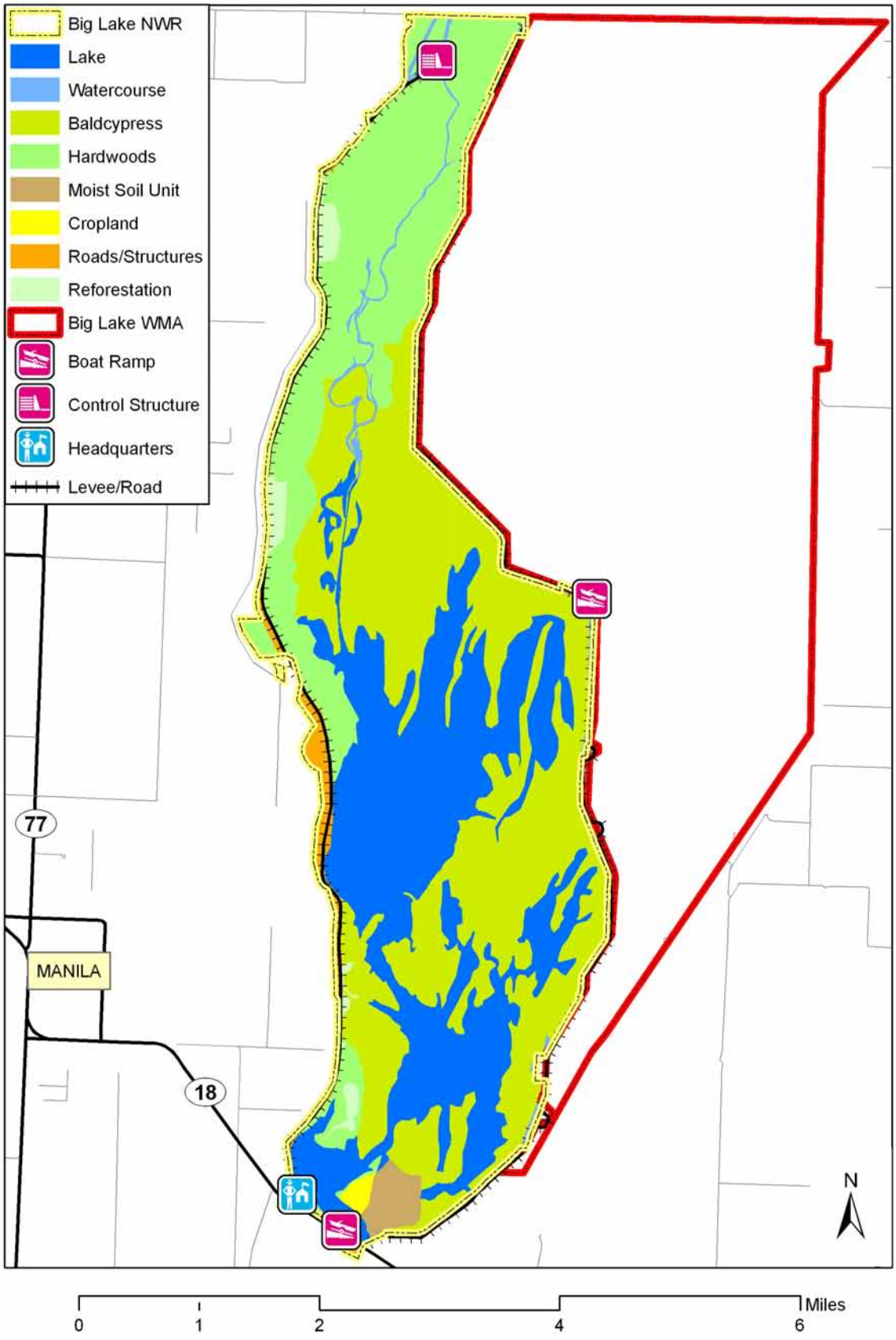
Big Lake NWR

Habitat types represented on Big Lake NWR (Figure 4) are as follows:

Cropland	42 acres
Moist-soil units	250 acres
Marsh	300 acres
Forest	2,159 acres
Open water	2,600 acres
Swamp	5,250 acres
Levees/dikes/administrative area	437 acres

In the northern Arkansas/Missouri Bootheel region, the Big Lake area is the last remnant of what had been the vast Mississippi Delta forest. The fertile soils, which were once covered with bottomland hardwoods, are now row-cropped to produce soybeans and cotton. The refuge persists as a forested oasis in an agricultural desert, and this isolated area of natural beauty is cherished by citizens of Arkansas. Except for the spoil levees and administrative areas, the rest of the refuge is classified as wetlands. The land contour ranges from 223' msl in the deepest channels near the south end to 240' msl near the north end.

Figure 4. Habitat Types on Big Lake NWR



Cache River NWR - Habitat types represented on Cache River NWR are as follows:

Cropland	3,106 acres
Moist-soil units	447 acres
Marsh	124 acres
Reforestation	15,524 acres
Bottomland hardwood forest	44,358 acres
Oxbow lakes, bayous, rivers	1,010 acres

Forest types for Cache River NWR are depicted in Figure 3.

Cache River NWR has utilized cooperative farming as one of several waterfowl management tools to meet waterfowl habitat objectives since the refuge's establishment in 1986. Rice, milo, soybeans, Japanese millet, and occasionally corn are grown on a rotating basis on the Dixie and Plunkett Farm Units. It should be noted that these two farm units are also used to meet refuge objectives for moist-soil plant production, winter browse, and migrating shorebird habitat in addition to row crop objectives for the refuge.

Despite the extensive and drastic drainage and channel alterations, the Cache River basin contains a variety of wetland communities, including some of the most intact and least disturbed bottomland hardwood forests in the Mississippi Valley region. These unique and valuable wetlands have been designated by the Ramsar Convention as "Wetlands of International Importance."

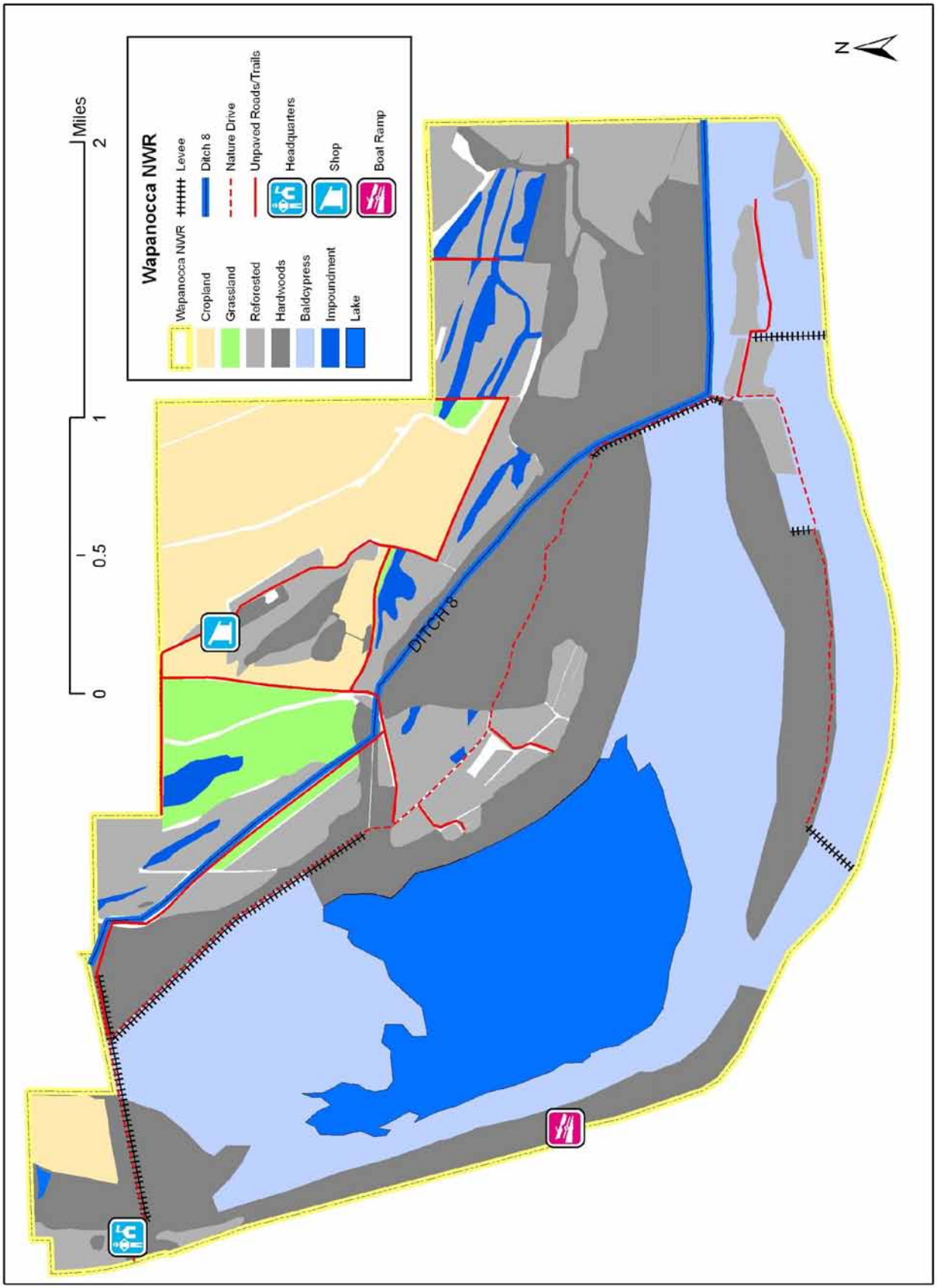
Forested land on Cache River NWR consists mostly of floodplain bottomland hardwoods, dominated by species such as willow oak, Nuttall oak, overcup oak, sugarberry, sweetgum, sweet pecan, bitter pecan, honey locust, persimmon, cypress, green ash, American elm, cedar elm, black willow, and red maple. Bald cypress-water tupelo swamps also comprise a significant portion of the lowest sites on the refuge.

During the last 15 or so years, more than 15,000 acres of agricultural and fallow fields have been planted in hardwood seedlings in an effort to link fragmented forested tracts and to create larger forest blocks for wildlife. Species planted include Nuttall oak, cherrybark oak, willow oak, water oak, overcup oak, sweet pecan, bald cypress, and a host of native hardwoods. Additional wetland areas on the refuge consist of approximately 447 acres of moist-soil units scattered throughout the farm fields. Moist-soil plants vary depending on the timing of drawdowns and soil disturbance, but usually consist of panic grass, smartweeds, sprangletop, millets, and a variety of sedges. An extensive network of lakes, streams, and bayous on the refuge provide an abundance of habitat for fishes, mussels, and other wetland-dependent species.

Wapanocca NWR - Habitat types represented on Wapanocca NWR (Figure 5) are as follows:

Cropland	761	acres
Grassland	73	acres
Open water	612	acres
Swamp	1,760	acres
Moist-soil	288	acres
Reforestation	917	acres
Bottomland hardwood forest	1,502	acres

Figure 5. Habitat Types on Wapanocca NWR



There is little old growth timber found on the refuge because it was logged while in private ownership. The invasive species Chinese privet and Japanese honeysuckle are common in the forested areas.

There are 32 small impoundments, with a total acreage of 288 acres with stoplog half-risers for water control. These impoundments are managed as moist-soil habitats for waterfowl, shorebirds, wading birds, and other native wildlife.

The Wapanocca Lake basin consists of 612 acres of open water and 1,200 acres of cypress/willow swamp. A concrete structure with two stoplog bays to control water levels is located at the northwest corner of the basin and empties into Big Creek. Woody Ponds is a 243-acre cypress swamp where water levels also are controlled by a stoplog structure. The remaining 317 acres of cypress swamps receive water from winter/spring flooding from ditch overflows and normally dry up during summer months.

WILDLIFE

Wildlife species that are known or expected to occur on the Central Arkansas NWR Complex are listed in Appendix G. Birds of conservation concern for the Mississippi Alluvial Valley (Bird Conservation Region 26) are listed by the refuge on which they occur in Appendix H. A brief discussion of wildlife species follows by refuge.

Bald Knob NWR

Birds

The refuge is noted for large numbers of wintering waterfowl, which have at times exceeded 650,000 birds. Mallards are the most numerous species, with Northern Pintail, American Widgeons, Gadwalls, Northern Shovelers, Green-winged and Blue-winged Teals, Scaup, Ringnecked Ducks, and Wood Ducks being common. The native Wood Duck and Hooded Merganser nest throughout the refuge. The refuge lies in the heart of the largest pintail wintering area in the state. As many as 250,000 pintail have been recorded wintering on the refuge. Peak waterfowl use normally occurs from November-December.

The refuge actively manages water and associated mudflats on approximately 150 acres for shorebirds. Shorebird use peaks around August 18, with approximately 5,000 birds. The most common species are Pectoral Sandpipers, Killdeer, Lesser Yellowlegs, Semi-palmated Plovers, Least Sandpipers, and Long-billed Dowitchers.

Marsh birds of primary concern in North America include King, Clapper, Virginia, Yellow, and Black Rails; Soras; American and Least Bitterns; Pied-billed Grebe; Purple Gallinule; and Common Moorhen. The refuge provides thousands of acres of suitable habitat for these migratory birds in any given year. While no confirmed nests have been recorded of any rail species, refuge personnel did observe a King Rail during June 2006. The American Bittern and Pied-billed Grebe are very common during spring migration, while the Least Bittern has been less documented. The only sighting of a Common Moorhen occurred during late spring 2007 by refuge personnel.

American, Common and Snowy Egrets; Great Blue and Little Blue Herons; and a host of other marsh birds utilize the various wetlands on the refuge throughout the year. Apart from the Great Blue Heron, which is a year-long resident, the other species usually arrive on the refuge around the middle of April. During the fall, additional migratory waders, such as Tri-colored Herons, White-faced Ibis, Wood Ibis, White Pelicans, and Roseate Spoonbills, are common. The refuge has an active rookery in a

cypress/tupelo brake on the Mingo Creek Unit. This rookery contains approximately 600 nests with a species composition of 65 percent Great Egrets, 32 percent Great Blue Herons, and 3 percent Anhingas.

Red-tailed Hawks, American Kestrels, and Northern Harriers are the most common raptors on the refuge and are observed frequently throughout the year. Other raptors which utilize the refuge include the Red-shouldered Hawk, and Screech, Barred, and Great Horned Owls. The Peregrine Falcon is often observed hunting shorebirds in April and from July-August. Bald Eagles frequent the refuge, particularly during the winter months as they follow the waterfowl migration. The refuge recently documented over 60 Bald Eagles utilizing the refuge.

Mammals

The most common mammals on the refuge are the white-tailed deer, gray and fox squirrels, swamp and cottontail rabbits, coyote, and armadillo. Furbearing species include the muskrat, beaver, mink, bobcat, spotted and striped skunk, raccoon, otter, and long-tailed weasel. Small mammals present are the eastern mole, short-tailed and least shrews, eastern chipmunk, various bats, cotton rat, eastern wood rat, cotton mouse, and harvest mouse.

Reptiles and Amphibians

A vast array of reptiles and amphibians utilize the numerous wetlands on the refuge. The most common snakes include the broad-banded water snake and the cottonmouth. Diamondback and yellow-bellied water snakes are also numerous. The unusual and interesting Grahm's crayfish snake has also been documented on the refuge.

The most common turtles include the red-eared slider and the spiney softshell. Alligator and common snapping turtles are also present, but less often observed.

Leopard frogs and bullfrogs are frequently observed as are Fowler's toads, green frogs, spring peepers, and chorus frogs. The spotted salamander, three-toed amphiuma, and lesser sirens have been documented on the refuge.

Fish

A large number of rough and game fish are present on the refuge. The most common species of rough fish include buffalo, drum, carp, and bowfin, while largemouth bass, crappie, several species of sunfish, and blue, channel, and flathead catfish are the more common game fish.

Threatened and Endangered Species

The Least Tern and the Piping Plover utilize the refuge during their spring and fall migration. These birds are usually observed feeding in various mudflats during July-September. However, these species have also been recorded during spring utilizing shallowly flooded fields. Additionally, Peregrine Falcons frequent the refuge and are often observed pursuing waterfowl and shorebirds.

Invasive Species

Nutria recently moved into the area and are causing considerable damage to refuge levees and roads from their burrowing activities. Armadillos also cause extensive damage to roads and levees by their burrowing. Wild hogs were first documented on the refuge last spring. Habitat

damage from their rooting activity is extremely high and they will out-compete other resident wildlife for mast and other food resources.

Invasive plant and tree species include Japanese honeysuckle, Chinese privet, Chinaberry, and Mimosa.

Big Lake NWR

Birds

Bald eagles are frequently documented on the refuge. They have nested on the refuge since 1993 and usually have one successful nest. Eastern wild turkey are abundant on the refuge. Each year, hundreds of thousands of waterfowl migrate to the refuge, arriving as early as September and peaking between December and January. Canada and white-fronted goose numbers have increased in recent years, reaching more than 15,000 during January and February. The Baker Island wheat field attracts White-fronted, Snow, and Canada geese. Mallard, Gadwall, American Wigeon, Northern Pintail, Green-winged Teal, Northern Shoveler, Canvasbacks, Redheads, and American Coot are frequent visitors to the refuge. The refuge hosts an exceptional breeding population of Wood Ducks and Hooded Mergansers.

Great Blue Herons and Great Egrets are common throughout the summer months on the moist-soil unit. The unit also attracts Little Blue Herons, Green Herons, and Snowy Egrets. American Bitterns are occasionally seen using the area. Cattle Egrets utilize the grazed portion of the Ditch 81 levee adjacent to the West side of the refuge throughout the summer. Double Crested Cormorants continue to use the refuge in increasing numbers. Several flocks of migrating American White Pelicans use the refuge from late-February and March and again throughout the summer months of June and July. The most common shorebird is the Killdeer. Sora Rails and Solitary Sandpipers use exposed mud flats in the moist-soil unit. American Woodcock are often observed on the levee road. Other species observed include various tern species such as Forster's Terns and Spotted Sandpipers. Red-tailed Hawks and Red-shouldered Hawks are often seen on the refuge. Also abundant on the refuge are Great Horned Owls and Barred Owls. Other raptors include Screech Owl and Cooper's Hawk.

Mammals

Deer are abundant and the population estimate for the refuge and the adjacent state-managed wildlife area is 300 – 500 animals. Excellent habitat and a lack of hunting pressure contribute to high populations of raccoons. Fox squirrel populations remain high on the refuge.

Bobcats are frequently sighted numerous times along the Ditch 81 levee. Otters are thought to be abundant as they are often observed crossing the levee road from Ditch 81 to the refuge.

Fish

A large number of rough and game fish are present on the refuge. The most common species of rough fish include buffalo, drum, carp, gar, and bowfin, while largemouth bass, crappie, several species of sunfish, and blue, channel, and flathead catfish are the more common game fish.

Threatened and Endangered Species

Bald Eagles (no longer listed as threatened) have nested successfully on the refuge since 1993. Fat pocketbook mussels are found throughout the refuge and juveniles were restocked within refuge waters in the early 2000s.

Invasive Animals

Beaver and nutria numbers are on the rise at Big Lake NWR. These two species cause significant damage to the refuge's forest communities and system of roads, levees, and water control structures. Feral hogs were released illegally onto the adjacent Big Lake WMA and have subsequently spread in onto the refuge in recent years and are being spotted more frequently by refuge users. Their foraging activities are damaging the forest floor and the main levee side slopes north of Timm's Point.

Cache River NWR

Birds

Waterfowl

The Cache River Basin is widely recognized for its importance as wintering habitat for waterfowl. It is identified in the North American Waterfowl Management Plan as the most important wintering area for Mallards in North America. During peak years, 400,000 to 500,000 Mallards have been estimated to winter within the acquisition boundary of the refuge. While Mallards are the dominant species, Green-winged Teal, Northern Pintail, and Gadwalls are also common. Waterfowl numbers usually start gradually increasing from November to December, peak in January, and drop off significantly in February.

Wood Ducks and Hooded Mergansers are the primary species of waterfowl that breed on the Cache River NWR. Both are cavity nesters adapted to bottomland hardwood ecosystems. The Hooded Merganser is an uncommon breeding species in the region, and does not occur anywhere in large concentrations. By virtue of the extent of its remaining bottomland hardwood and permanently inundated wetlands, the Cache/Lower White Rivers' ecosystem is the most important breeding area for Wood Ducks in Arkansas; however, the secretative habits of the species have prevented the development of valid survey methods or population/density estimates. The large amount of mature forest and thus natural cavities, preclude the need for Wood Duck nest boxes.

Neotropical Migratory Birds and Resident Songbirds

Neotropical migratory bird species are experiencing long-term declines as a result of habitat loss across their full range of breeding and migrating habitats in North America and their wintering habitats in Central and South America. However, the proximate causes of the decline are not as clear, and evaluation of the problem is complicated by their intercontinental range and by the fact that this group of migratory species is composed of over 250 individual species within a number of different habitat guilds. As a group, resident songbirds are not currently exhibiting the degree of recent population decline documented for neotropical migratory species; however, it seems apparent that the 85 percent habitat loss in the ecosystem must have caused a commensurate decline in resident songbird populations and distributions from a historic perspective. Migratory songbirds that overwinter in the habitats of this ecosystem generally have not experienced population declines as dramatic as those of the neotropical species.

Neotropical migratory birds that use Cache River NWR are listed in Appendix G.

Marsh Birds

Secretive marsh birds include all species that primarily inhabit marshes (non-forested wetlands). Primary species of concern in North America include the King Rail, Clapper Rail, Virginia Rail, Sora, Black Rail, Yellow Rail, American Bittern, Least Bittern, Pied-billed Grebe, Purple Gallinule, and Common Moorhen. The American Bittern has been identified as a Bird of Conservation Concern by the Service due to the lack of basic population information. In Arkansas, population information on secretive marsh birds, such as status and distribution, is limited. Michael Budd and Dr. David Krementz from the USGS Arkansas Cooperative Fish and Wildlife Research Unit at the University of Arkansas have completed preliminary secretive marsh bird surveys in the Delta region of eastern Arkansas. Soras and American Bitterns were recorded at sites on, or near, the refuge in 2006. Both of these species were observed during spring 2007 on Cache River NWR in a Wetlands Reserve Program (WRP) impoundment and in a wetland located in a recently reforested area.

Wading Birds

Wading birds, such as Great Blue Heron, Great Egret, Snowy Egret, and Green Heron, are abundant in waterfowl impoundments, canals, bayous, oxbow lakes, and marshes throughout the year on the Cache River NWR. No known wading bird rookeries occur on the refuge.

Shorebirds

Shorebirds migrate through the LMV from the southern-most parts of South America to the northern-most parts of North America. They typically probe in soft mud (e.g., mudflats) and shallow water for worms and small invertebrates. In the LMV these birds generally move through during spring and fall, foraging as they migrate. They may only spend 10 days in the LMV, with very few overwintering or nesting in the LMV.

Quality shorebird habitat is also limited during the summer and early fall on Cache River NWR, since a majority of potential shallow water sites are in some form of cropland, moist-soil vegetation, or regeneration. The shallow water impoundments on newly acquired WRP sites, such as the Howell Tract, hold the most potential for shorebird use and management because of their diversity of water depths and mud bottom. Some shorebirds that occur on the refuge are Killdeers, Willets, Least Sandpipers, Lesser Yellowlegs, Black-necked Stilts, Solitary Sandpipers, Peeps, and Common Snipes.

American Woodcock

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

Cache River NWR contains a substantial amount of habitat that appears to be suitable for woodcock. Because woodcock hunting is not a traditional pursuit in Arkansas, there is almost no information available about the species for the state. Nevertheless, one would suspect that Arkansas' lowlands must be important migratory habitat given the large population which migrates to and is known to overwinter in Louisiana. The abundance of migrating woodcock on the refuge has not been quantified to date, but birds have been observed during pilot surveys.

Eastern Wild Turkeys

The primary resident game bird in the ecosystem, and one of special public interest, is the wild turkey. Being primarily associated with the mature hardwood forests of this region, turkeys once were distributed throughout the ecosystem. However, they are now generally restricted to larger blocks of forests, partly because those are most likely to contain a variety of habitats occurring at least to some extent on high ground. Turkeys utilize large blocks of open forest, young afforestation tracts, and open fields. The primary limitation to turkey populations in the more northern areas of the ecosystem, where the habitat becomes increasingly constricted along the watercourse, is the relative absence of forested lands above the 1- or 2-year floodplain.

Bald Eagles

During the winter, Bald Eagles are commonly sighted on the refuge, usually over open areas or bodies of water, while searching for prey. Eagles are found near large concentrations of waterfowl during the winter months on the refuge. Over the past 5 years, two pairs of Bald Eagles have nested near Rainbow Lake and near Opossum Creek. Both nests were constructed in the tops of cypress trees and each of these nesting pairs annually produced fledged eaglets.

Mammals

White-tailed Deer

The refuge consists of a mixture of farm fields, afforestation, moist-soil impoundments, and bottomland hardwood forests that create a mosaic of different habitats that provide for excellent cover and forage for white-tailed deer and other wildlife. Deer appear to be abundant based on general observations and harvest data. Deer herd health checks conducted by the Southeastern Cooperative Wildlife Disease Study (SCWDS) in 2007 indicate that deer on the south part of the refuge were in good physical condition and the herd was thought to be below carrying capacity. However, deer collected by SCWDS in the central part of the refuge showed signs of a higher population size close to carrying capacity, and SCWDS recommended reducing the population to a more healthy level.

Furbearers

A number of furbearers, including raccoon, mink, muskrat, opossum, coyote, bobcat, beaver, river otter, red fox, gray fox, and striped skunk, are thought to be common on the refuge. Beaver, muskrat, river otter, and mink are associated with the more permanently inundated wetlands and bayous. The raccoon is well-adapted to all existing habitats, and the opossum, coyote, foxes, and bobcat are more associated with drier forest and afforestation sites. Little or no formal data are available to provide population estimates for these species; however, general observations indicate that beaver and raccoon numbers have increased in recent years. These two species are of concern because of their high potential to negatively impact habitat and other wildlife species.

Small Game Species

Gray and fox squirrels are both abundant and distributed throughout the refuge where suitable, mast-producing forested habitat is available. Although they share habitats to some degree, gray squirrels are most common in deep woods, whereas fox squirrels prefer small woodlots and the edges of larger forested tracts. Their high potential recruitment rate (controlled largely by levels of available hard mast), high natural mortality rates, and other population processes would lead to the expectation that no significant long-term changes in their population densities within available habitat have occurred.

Cottontail rabbits and swamp rabbits are relatively common throughout the refuge; their numbers are largely controlled by the extent of available habitat. The rabbit population is usually higher in and around afforestation sites.

Black Bears

Black bears were once common in the Cache/Lower White Rivers' system before large blocks of forest were cleared for farming and other purposes. By the early 1900s, black bears had been virtually eliminated from the state except for a very small population, which survived in the most remote portion of the Lower White River. As a result of protection afforded by the refuges and state hunting regulations, black bear numbers increased significantly on the lower portion of White River NWR and surrounding forested area. Black bears are sighted on or near the Cache River NWR several times a year. Sightings are probably males passing though or juvenile males searching for a territory. Female bears, which determine population expansion in an area, are not thought to occur on the refuge with the possible exception of the large forested Biscoe tract on the southern end of the refuge. Bear hair-snare surveys (DNA) were conducted in the Biscoe area by refuge personnel in cooperation with the AGFC during the summers of 2007 and 2008, to determine bear abundance and sex. No visits by bears were recorded. All bear sightings reported to the refuge office over the last 5 to 10 years have been maintained in a database.

Reptiles and Amphibians

The refuge's moist, forested bottomland hardwood habitat, bayous, oxbows, and impoundments are conducive for an abundant and diverse reptile and amphibian community. Numerous species of salamanders, frogs, and toads are present along with different species of turtles, snakes, lizards, and skinks (Appendix G). A detailed species list and associated habitat is lacking. A survey conducted in 2006 by the refuge biologist to detect amphibian abnormalities indicated that amphibians on the refuge were healthy.

Fish

Bottomland hardwood wetlands provide spawning and nursery habitat to many species of fish. Hydrology (primarily extent, duration, and periodicity of flooding) is one of the primary factors regulating utilization and reproductive success of fishes in wetlands. Thirty-six species of larval fish and 51 adult species were collected in a 1994 fisheries study in the flooded bottomland forest in the Cache River (Appendix G). Fisheries appear to be thriving in the Cache and White Rivers, Bayou DeView, and other bayous and numerous oxbows throughout the refuge. Among the fish found in refuge waters are various species of crappie, bream, catfish, bass, buffalo, carp, alligator gar, and paddlefish.

Threatened and Endangered Species

Ivory-billed Woodpecker

The Ivory-billed Woodpecker (IBWO) was once an inhabitant of forested habitats throughout the southeastern United States and Cuba. Although there are little specific population data available, it is likely that European settlement and the clearing of the forests caused the species to decline in the latter half of the 19th century. By the mid-20th century the IBWO was reduced to a very small population. The most famous study of these birds was conducted by Arthur Allen and James Tanner at the Tensas River in Louisiana in the late 1930s. The last widely accepted sightings were made in the Tensas area by Don Eckleberry in 1944. Since that time, there have been numerous

unconfirmed sightings throughout the historic range of the species. Many of these sightings seemed highly credible but lacked hard evidence.

In February of 2004, Cornell Laboratory of Ornithology biologists became aware of reports of credible sightings of the IBWO in a portion of Bayou DeView, which is located on Cache River NWR. Subsequently, Cornell biologists and their partners documented the presence of at least one IBWO (Fitzpatrick et al., 2005) in that area.

A small stretch of the Bayou DeView was thought at one time to be providing some or all of the life cycle requirements for the individual(s) sighted on the refuge. Sixteen sightings of the IBWO were documented deep within the cypress-tupelo swamp of Bayou DeView in 2006.

Researchers from Cornell, with assistance from personnel from TNC, Arkansas Audubon, AGFC, and the Service, along with numerous volunteers, have been faithfully searching the Big Woods of Arkansas, including Cache River NWR, for the last several years. There have been many reported sightings, interesting audio, and other supporting data, but no additional video or still pictures have been recorded. A helicopter search conducted in February 2008 failed to produce any sightings of IBWO.

The refuge has been supporting the IBWO search team when and where possible. Cache River NWR's forester and wildlife biologist have been conducting IBWO Habitat Inventory and Assessment of the forest on the refuge to determine potential habitat.

Other threatened or endangered species that have not been found on the Cache River NWR but potentially could occur are fat pocketbook mussels, Least Terns, American alligator (listed due to similarity of appearance), and Piping Plovers.

Wapanocca NWR

Birds

There are 262 bird species known to visit the refuge. A large Great Blue Heron/Great Egret rookery (400+ nests) is located in the cypress trees north of the lake. Anhingas and Yellow-crowned Night Herons have also been known to nest in the rookery. A resident pair of Bald Eagles nests on the refuge yearly. Least Terns forage during the summer months over the lake. Snow Geese, once seldom seen in the area, now number up to 10,000 in the winter, attracted by the increased conversion of row crops to rice fields. During extremely cold temperatures in the winter, when most of the water bodies outside of the refuge are frozen, up to 100,000 ducks will flock to the lake. The majority of these birds consists of Mallards, but a great diversity of other ducks can be found as well. Large numbers of Shoveler, Northern Pintail, and American Widgeon can be found, as well as many diving ducks such as Ringnecked Ducks and Scaup. Wood Duck nest boxes (50) are maintained yearly to enhance production of Wood Ducks. Hooded Mergansers and mallards also nest on the refuge. White Pelicans have been seen on the refuge, as well as Great Blue Herons and Great Egrets.

Mammals

Beaver are common and have become problematic with their damming of the drainage ditches, causing subsequent flooding onto private adjacent lands. Raccoons also occur in abundance. A large white-tailed deer population occurs and is estimated to be over 200 animals in the winter.

Reptiles and Amphibians

Three venomous snakes are found on the refuge and include cottonmouth water moccasin, copperhead, and timber rattlesnake. An array of frogs and toads occurs on the refuge.

Fish

Historically, fishing on Wapanocca Lake was excellent as the lake was known as the premier bluegill and crappie fishery in the area. Good populations of catfish and bass were also found. Due to unstable water levels since the rehabilitation of Wapanocca Lake in 2004, fish populations have not come close to approaching historic levels. Currently, Carp, Grinnell, and Gar make up the majority of the fish population, with very few crappie and catfish being found. As water levels become more stable through restoration efforts, a more consistent fishery is expected

Threatened and Endangered Species

No threatened and endangered species are known to exist on Wapanocca NWR.

Invasive Animals

Nutria were first discovered on the refuge in 1993. Nutria increase during mild winters and damage to cypress seedlings and levees are commonly observed.

Armadillo have moved into the refuge and it is suspected they have tunneled into levees and dikes, causing eventual failure.

Wild (feral) hogs are occasionally seen on the refuge, but populations have not yet become a problem.

CULTURAL RESOURCES

Bald Knob NWR

To date, no cultural resources surveys or inventories have been conducted at Bald Knob NWR.

There are however, numerous sites along the Little Red River and Overflow Creek that native Indians temporarily used. The Arkansas Archaeological Society documented several sites decades ago before establishment of the refuge. Prior to the establishment of the refuge in 1993, artifact hunters dug pots and surface-collected items such as arrowheads, bird points, and flint in agricultural fields scattered throughout the area. Most of the fields containing these sites have been removed from crop production and planted to bottomland hardwoods, which serves to protect the cultural resources that remain.

Currently, there are 18 historic properties recorded on the refuge. The majority of these are pre-Columbian archaeological sites, although several are 19th century farm or house sites. The now abandoned “Soybean House” is a square brick house built in 1925, and located in the northeast corner of the refuge. The Soybean House was documented during a county-wide architectural survey in 1986, but a period of significance was not identified. None of the archaeological sites have been subjected to systematic scientific testing or evaluation for inclusion on the National Register of Historic Places. However, the archaeological sites continue to be favorite targets for local artifact collectors and looters.

Big Lake NWR

The refuge has one major archaeological site located at the north end just south of the water control structures called the Zebree site. The site was excavated prior to the completion of the Ditch 81 project, and the artifacts recovered were catalogued by the Arkansas Archeological Survey. The Service is currently working with the Quapaw tribe to repatriate the remains at or near the Zebree site.

Cache River NWR

The Arkansas Archaeological Survey, under contract with the Corps, studied the Cache River and Bayou DeView in 1974. Field work associated with this project, which concentrated on the lower reaches of both drainages, identified 61 archaeological sites within approximately 1 mile on both sides of the Cache River and Bayou DeView channels. All discovery sites contained evidence of prehistoric Indian occupation, with the possible exception of one. The earliest evidence of man in the study area is from the Paleo-Indian period, circa 10,000 B.C. The majority of these prehistoric sites were located on natural levees, low-lying terraces, and low sandy knolls. In addition to elevation, the major factor determining the location and utilization of sites appeared to be soils. A strong correlation was observed between site location and areas of sandy soil with high natural fertility. These soils are all of the Bosket fine sandy loam, Dubbs fine sandy loam, and Dundee fine sandy loam types. In contrast, no sites were associated with the areas of sandy well-drained soils which have low natural fertility (Beulah-Bruno association).

There are several cemeteries dating to the late 1800s known to occur on the refuge. The remnants of railroad spurs that facilitated the first logging of the forests, which also date to the late 1800s, are found on the refuge. Additionally, an old railroad tram crosses the refuge and a steam-powered water pump which was used to fill steam engines also is located on the refuge.

Wapanocca NWR

A cultural resources survey was completed on the refuge by Northeast Louisiana University in 1978. Numerous isolated prehistoric and historic artifacts were found. Sites of interest were as follows:

<u>Prehistoric sites</u>
3CT139 – At least 125 X 50 meters, located at cooperative farmer temporary storage area and partially reforested.

3CT151 – 100 X 75 meters, located just north of the intersection of Ditches 2 and 3. Area was left to regenerate to trees.

<u>Historic sites</u>
3CT124 – 200 X 50 meters in the vicinity of the present day paved visitor parking area is associated with houses once occupied by the club's paddlers.

3CT127 – Small mound 150 feet west of headquarters building is believed to be the remains of a birdbath and garden.

3CT153 – Old club house which was located just west of the present day office building on the west side of the entrance road was demolished during landscaping and construction of the headquarters complex in 1980.

Regional Historic Preservation Officer Richard Kanaski conducted an archaeological survey around the margins of Wapanocca Lake during its drawdown in 2005. The main search was for pre-Columbian canoes, but none were found. However, the remains of three 20th century plywood flat-bottom boats were found, although they were not considered significant historic properties.

SOCIOECONOMIC ENVIRONMENT

Bald Knob NWR and Cache River NWR

The general socio-economic setting of the Cache/Lower White Rivers' region is generally similar to that of the broader Mississippi River Delta, and can be characterized as follows: (1) Strongly agriculturally oriented; (2) low relative per capita incomes; (3) relatively high rates of unemployment; and (4) relatively low, sparsely distributed, and stable or decreasing population. Jonesboro is situated at the northeast edge of the watershed, and is by far its largest city with a population of 46,535. The other significant population centers are Brinkley (4,234), DeWitt (3,553), Clarendon (2,072), McCrory (1,971), and Cotton Plant (1,150), with numerous small communities of less than 1,000 scattered throughout the region.

Agriculture in the area is dominated by soybeans and rice, with a substantial amount of wheat grown on well-drained areas, lesser amounts of corn and milo scattered throughout, and some cotton production on the best drained, sandiest soils. Arkansas leads the nation in rice production (approximately 40-50 percent of annual national production), and the Cache River Basin significantly contributes to this total. There is also a relatively small but growing acreage of land dedicated to aquaculture production.

The forested wetlands and aquatic habitats of the basin have historically provided extensive wildlife-dependent recreation. The relative importance of hunting and fishing to Arkansans, as revealed in a survey of hunting and fishing conducted by the Service in 1995, can be illustrated by the following comparisons:

- Arkansas ranked sixth among all states in the percentage (32 percent) of its population which hunted or fished, 52 percent greater than the national average.

- The proportion which hunted and fished was 100 percent greater than the national average and the proportion that hunted was 150 percent greater.

Similarly, participation by residents of the Cache/Lower White Rivers and the surrounding region probably exceeded these statewide averages probably because wildlife-dependent recreation represents the traditional primary recreational opportunity in the area. Public use within the region is of intense interest to Arkansans for three principal reasons:

- The fish and wildlife habitats in the Cache/Lower White Rivers' ecosystem represent approximately 40 percent of all suitable areas for wildlife-dependent recreation in the Arkansas Delta.

- A significant proportion (65 percent) of the habitats in this ecosystem are in public ownership, with 89 percent of that being federal.

- These habitats retain very high fish and wildlife values relative to the remainder of the Delta (U.S. Department of the Interior 1995).

Big Lake NWR

Mississippi County was created November 1, 1833, of territory cut from Crittenden County and was named for the mighty river forming its entire eastern boundary. Osceola was the original county seat, but a second seat was added when Blytheville became the seat of justice for the northern section in 1870. The landscape of Mississippi County is flat, fertile, delta farmland with little forested acreage remaining. The economy is driven by and dependent on diversified farming and light manufacturing.

In 2005, the population estimate for Mississippi County was 47,911 residents. This represented a percent change of -7.8 percent from April 1, 2000, to July 1, 2005. The population was comprised of approximately 64 percent white and 34 percent black persons, with American Indians, Alaska natives, and other races comprising the remaining 2 percent of residents. Per capita personal income for the county was $22,958. The median household income for the 19,349 households in the county was $27,760. Persons living below the poverty level in Mississippi County totaled 22 percent of total residents in 2003. About 65 percent of county residents were high school graduates and 11 percent had a Bachelor's degree or higher.

Challenges common to most areas of the Lower Mississippi Delta, including Mississippi County, are long-term poverty, crime, teen pregnancy, and a lack of affordable housing. The town of Manila is located 3 miles west of the refuge and is the only town in Mississippi County experiencing population growth.

Wapanocca NWR

Crittenden County was formed on October 22, 1825 and was the twelfth county in Arkansas. In 2007 the county population was 52,103, with 80 percent of the population living in an urban setting and the remaining 20 percent rural. The county seat is Marion, but the largest city is nearby West Memphis. Like many Mississippi River Delta counties, the poverty level in Crittenden County is higher than the state average.

Crittenden County is part of the Memphis Metropolitan area, with most of its population growth being from families that work in Memphis, Tennessee, but choose to live in Crittenden County due to more affordable housing. Unfortunately, along with many of the families moving to West Memphis, much of the crime from Memphis follows, as the crime rate in the city is almost three times the state average, while Marion, just 4 miles to the north, is below the state average.

REFUGE ADMINISTRATION AND MANAGEMENT

VISITOR SERVICES

BALD KNOB NWR

Bald Knob NWR has a public use program that serves an estimated 30,000 visitors annually. The most popular uses are consumptive ones–hunting and fishing. The refuge was accepted as Arkansas' 22nd Important Birding Area by the Audubon Arkansas Board on June 16, 2005. Since that time, wildlife observation and photography have increased significantly every year. However, there is no visitor services specialist on the staff.

The refuge continues to be an important area for graduate students to conduct research projects involving waterfowl and other migratory birds, agricultural and moist-soil production, resident species, and forestry studies. The refuge is open to the public throughout the year except for November 15 to

February 28, the waterfowl sanctuary, which is closed to all public entry and use to protect waterfowl and wintering eagles from disturbance. Most refuge roads, with the exception of those located within the waterfowl sanctuary areas, are open to the general public all year. Roads may be closed at any time due to hazardous or poor road conditions. All-terrain vehicle and bicycle access is permitted on established roads and levee tops on the Farm Unit and on designated roads on the Mingo Creek Unit. Horses, personal watercrafts, hovercrafts, and airboats are prohibited.

Hunting

Public land is the only place where many people have access to hunt and many hunters have expressed their appreciation to the refuge for allowing various types of hunting. Waterfowl hunting on the refuge has been successful and the majority of hunters are proud to have the opportunity to hunt on the refuge.

The refuge experiences large fluctuations in the number of duck hunters from year-to-year, as well as within any given year. The major contributing factors are the amount of water and habitat available for hunting in other areas of the state. When parts of the state are extremely dry, Bald Knob NWR has experienced over 150 hunters on several days. However, when the White, Cache, and other major rivers are in flood stage, the number of hunters utilizing the refuge is minimal, with many days having less than 20 hunters. The quality and success of a hunt is inversely proportional to the number of hunters on the refuge. Hunter success rates and overall quality of the hunt experience are higher when the number of hunters using the refuge is lower.

The refuge farming contract requires the cooperative farmer to pump and maintain a flood on the refuge's share of crops that are left unharvested during the month of November. The farmer must also pump and flood the acreage designated as moist-soil impoundments. In 2008, that acreage amounted to nearly 1,100 acres, which is located mostly (65-80 percent) in the waterfowl hunting area. In most years, additional acres are inundated because of leakage from canals and other factors.

The refuge allows morning-only waterfowl hunting seven days a week and hunters are allowed to use all-terrain vehicles. The hunters are allowed to hunt the fields (within the waterfowl hunting area) on a first come-first serve basis. Waterfowl hunting on the refuge follows the state season and bag limits. There is a possession limit of 25 shotgun shells per hunter and hunting groups must stay a minimum of 100 yards apart. Hunting from permanent blinds is prohibited and hunters must remove all decoys, blinds, boats, and other equipment daily by 1:00 p.m. Hunters are not allowed to cut holes or do any manipulation to vegetation, such as mowing, cutting, and weed-eating, or to hunt from areas of manipulated vegetation. Hunters are allowed to enter the refuge at 4:00 a.m. Commercial hunting or guiding is strictly prohibited.

Hunters are accustomed to these waterfowl regulations and for the most part there have been minimal conflicts. Most conflicts that do occur are during the first few days of the waterfowl season. This is especially apparent in dry years when the refuge has the majority of the available habitat in the surrounding area.

The refuge has allowed youth waterfowl hunts since 1999, and they have been received with much anticipation and enthusiasm. Approximately 10 – 20 different groups of youth hunters participate in the hunt in any given year and they have had varying degrees of success. The refuge intends to continue with this hunt. The value of this hunt is that it offers youth a positive hunting experience.

In 1999, the refuge incorporated a more liberalized goose hunt by allowing all day hunting for Snow Geese after the close of the regular waterfowl season in January. The waterfowl sanctuary remains closed until March 1, at which time it also is open to Snow Goose hunting under the state's conservation order.

All hunting on the refuge requires the hunter to sign and possess a current refuge hunting permit, which is found on the front of the hunt brochure. Numerous hunting opportunities are available on the refuge. Refuge hunts are summarized in Table 1.

Table 1. Hunting opportunities offered at Bald Knob NWR for the 2008-09 season

Deer – Archery	October 1, 2008 – February 28, 2009
Deer – Youth Gun	November 1 – 2, 2008
Deer – Gun Permit Only	November 8 – 9, 250 permits available
Deer – Muzzleloader	October 18 – 26, 2008
Squirrel – Fall Only	September 6, 2008 – February 28, 2009
Rabbit – Fall	September 6, 2008 – February 28, 2009
Raccoon	November 15 – 30, 2008
Opossum	November 15 – 30, 2008
Quail	November 1, 2008 – February 10, 2009
Waterfowl	State Season, Morning Hunt Only
Dove, Snipe and Woodcock	May be taken when seasons correspond with duck and/or goose season.
Turkey (Fall Archery)	Mingo Creek Unit Only – State Season

Fishing

Fishing begins in early spring and continues through fall. Most of the fishing activity occurs in the 80-mile network of flume ditches and canals throughout the refuge and on the larger permanent bodies of water such as Pole Brake. Approximately 7,000 fishing visits are recorded each year. Most anglers fish for largemouth bass, crappie, bream, various sunfishes, and catfish. Bowfin and drum are often caught incidental to the game fish. Most anglers bank fish with rod and reel around the numerous field drainage and irrigation canal pipes. Fish congregate around these water control structures, especially when water is flowing through them. To increase fishing opportunities, the refuge built and maintains seven boats ramps and associated parking areas. These areas provide access to Overflow Creek, Eagle Nest Brake, and Pole Brake, and consist of primitive dirt ramps as well as improved concrete ramps. Fishing activity is greatest during the crappie and bream spawning periods. During summer, most fishing activity is restricted to early morning and nighttime due to extremely hot temperatures.

Frogging is allowed and continues to be very popular, especially during the weekends. The refuge does not allow commercial fishing.

Wildlife Observation/Photography

This segment of public use is still relatively small on the refuge compared to hunting and fishing, but visitation to pursue wildlife observation and photography have steadily increased as the public becomes more aware of the opportunities that exist. There are nearly 100 miles of refuge roads and levees open to conventional vehicles that provide plenty of access for good wildlife viewing. These activities are especially high during the late summer/early fall when the refuge provides mudflats for migrating shorebirds. In addition to the shorebirds, thousands of herons and egrets use the shallow water and associated mudflats. Birdwatchers and amateur photographers from around the state converge on the refuge to observe and photograph these birds. Various chapters of the Audubon Society schedule field trips each year during this time to observe shorebirds, wading birds, rails, and other marsh birds. Audubon groups from Searcy, Jonesboro, Little Rock, Harrison, and other towns across Arkansas (and many from Tennessee) make at least one field trip to the refuge during the year. The refuge is known throughout the birding community as the best and most consistent area in the state for viewing wading birds and shorebirds. As waterfowl begin arriving in October and November, hundreds of birdwatchers and optimistic duck hunters also flock to the refuge.

Environmental Education/Interpretation

This type of public use is minimal. Local junior high and high school groups occasionally make field trips to the refuge. Professors at the local university also bring students in birding, herpetology, and biological classes to the refuge at least a couple of times each year. The classes are generally small and contain less than 20 students.

Big Lake NWR

A variety of public uses occur on Big Lake NWR. Fishing and hunting are the predominant activities but wildlife observation, boating, and photography also attract quite a few visitors. The refuge is open to the public during daylight hours only. No visitor services specialist is on the refuge staff.

Hunting

All hunting on the refuge requires the hunter to sign and possess a current refuge hunting permit, which is found on the front of the hunt brochure. Hunting is allowed on the refuge for deer, squirrel, rabbit, raccoon, and opossum. Refuge hunts are summarized in Table 2. Hunter check station information is summarized in Table 3.

Table 2. Hunting opportunities offered at Big Lake NWR for the 2009-09 season

Deer – Archery	October 1 – December 31, 2008
Squirrel – Fall Only	September 6 – October 31, 2008
Rabbit – Fall	September 6 – October 31, 2008
Raccoon and Opossum (Hunt Only)	October 6 – 21, 2008

Table 3. Hunter participation and harvest data for Big Lake NWR's 2008-09 season

2008 Hunter Check Station Information			
	November	**December**	**Season Total**
Hunter Days	475	206	681
Antlered Harvested	6	0	6
Anterless Harvested	2	1	3
Button Buck Harvested	1	0	1
Totals	**11**	**1**	**10**
	Hunters	**Hours Hunted**	**Harvest**
Raccoon	6	24	4
Squirrel	12	125	25

Fishing

Fishing is the number one public use activity on the refuge. There were an estimated 20,000 fishing visits and 50,000 activity hours recorded for 3,200 acres accessible to anglers. Big Lake NWR and Mallard Lake, located on the adjacent Big Lake Wildlife Management Area, contain the only two major fishing areas open to the public in Mississippi County. Fishing pressure is usually heavy. Peak use occurs in May and June during the bream spawn. A fully accessible fishing pier is located at Bright's Landing and is well visited. Bank fishing access is provided off of two interpretive foot trails. Two public boat ramps are located on the refuge. Fishing is allowed throughout the refuge during March through October. During November, December, January, and February (waterfowl sanctuary closure), fishing is restricted to 200 acres south of the Sand Slough dam site and limited to non-motorized boats with electric trolling motors.

Commercial fishing is allowed under the same guidelines as for sport anglers. Commercial fishing permits are available for $25 each. Anglers must also abide by special conditions attached to their special use permit. The annual commercial harvest is calculated by compiling monthly commercial fishing reports, which all commercial anglers must submit as part of their permit conditions. There were four commercial fishing permits issued in 2008, and harvest was as follows:

2005 Commercial Fish Harvest							
	Buffalo	**Carp**	**Catfish**	**Drum**	**Gar**	**Bowfin**	**Shad**
Weight	4,600	3,200	280	28	160	40	28

Wildlife Observation/Photography

Vehicle, walking, and boat access allow for many wildlife viewing opportunities. Additionally, the Bald Cypress Wildlife Drive begins at the refuge headquarters and extends the full 10-mile length of the refuge to the northern boundary. The first 3 miles of this drive, to Timm's Point, is open year-round. A scenic overlook is located at Timm's Point, offering excellent wildlife viewing opportunities for waterfowl, wading birds, Ospreys, and Bald Eagles. Timm's Point and Bright's Landing have permanently mounted spotting scopes that offer wildlife viewing opportunities year-round. Viewing highlights include foraging waterfowl, eagle nesting activities, and white-tailed deer.

Interpretation

The refuge has three interpretive kiosks that provide users with information regarding refuge management activities, waterfowl migration, and refuge goals and mission. Interpretive kiosks are located at the refuge's visitor contact station, Timm's Point, and Bright's Landing. Inside the Visitor Contact Station, visitors can view interpretive displays of native fishes and archaeological artifacts.

Environmental Education

Students from nearby schools participate in an outdoor learning day at the refuge. Topics covered include the importance of the Service and the significance of Big Lake NWR for wintering and migrating waterfowl and endangered species recovery.

Cache River NWR

Cache River NWR has a public use program that serves an estimated 147,000 users annually; however, there are no Visitor Services staff on the refuge. The most popular uses include hunting, fishing, other water-related recreation, photography, and wildlife observation. The refuge is in an active acquisition phase, therefore, isolated land tracts are scattered throughout the acquisition boundary making access to some tracts difficult. The refuge is open to the public throughout the year except for seasonal closure of the waterfowl sanctuaries, which is November 15 to February 28, primarily aimed at protecting waterfowl and wintering eagles from disturbance. These seasonally closed areas consist of six waterfowl sanctuary areas that include: Dixie Farm Unit (2,768 acres), Plunkett Farm Unit (1,081 acres), George Tract Unit (835 acres), Bank of Brinkley Tract (190 acres), Highway 145 (90 acres), and the Nicholson Tract (313 acres). Most refuge roads with the exception of those located within the waterfowl sanctuary areas are open to the general public all year. Roads may be closed any time due to hazardous or poor road conditions. All-terrain vehicle and bicycle access is permitted on designated roads and parking areas only, and only in support of priority public uses. Horses, personal watercrafts, hovercrafts, and airboats are prohibited.

Hunting

The refuge offers numerous public hunts, the most recent hunt seasons are summarized in Table 4.

Table 4. Hunting opportunities offered at Cache River NWR for the 2008-09 season

Deer – Archery	October 1, 2008 – February 28, 2009
Deer – Youth Gun	November 1 – 2, 2008
Deer – Modern Gun Permit Only	November 8 – 11 and 14 – 16, 2008 2,000 permits available
Deer – Muzzleloader	October 18 – 22, 2008 and December 29 – 31, 2008
Squirrel – Fall Only	September 6, 2008 – February 28, 2009
Rabbit – Fall	September 6, 2008 – February 28, 2009
Raccoon	November 15, 2008 – March 31, 2009
Opossum	November 15, 2008 – February 28, 2009
Quail	November 1, 2008 – February 8, 2009
Waterfowl	State Season, Morning Hunt Only
Dove, Snipe, and Woodcock	May be taken when seasons correspond with duck and/or goose season.
Turkey (Spring Firearms)	Hunt Unit I, State Season Hunt Unit II, Closed, Except Black Swamp Permit Hunt Hunt Unit III, State Season
Turkey (Fall Archery)	State Season

A current signed, free refuge hunting permit (found on the front of the hunt brochure) is required by all hunters participating in any hunting activity. In addition to the species listed above, beaver, nutria, feral hog, armadillo, and coyote may be taken during any refuge hunt by the use of equipment legal for that particular hunt.

Fishing

Fishing is an extremely popular activity on the refuge, with anglers targeting several of the 95 species of freshwater fish known to occur in the vast aquatic habitats of the Cache/Lower White Rivers' ecosystem. There are seven concrete boat ramps and 28 gravel or dirt ramps that provide access to the Cache and White Rivers, Bayou DeView, and numerous lakes located throughout the refuge. The most important fish to these user groups are largemouth bass, bluegill, crappie, and catfish. Peak use is during April – July.

A youth fishing event is conducted annually the first weekend in June and is open to youths 12 years old and under. The event is held at Miller Pond, which is stocked with catfish by AGFC, and is attended by over 100 youths. This event has been very successful and is supported by numerous local businesses.

Commercial fishing is allowed on the refuge and requires a special use permit and a $ 50 fee. Commercial fishermen are required to abide by all state regulations and special conditions attached to their refuge special use permit. Commercial fishing is allowed on specified areas of Cache River NWR in accordance with the seasons and methods listed below:

- February 1 to May 1 - all refuge waters except sanctuaries which open March 1.
- May 1 to October 31 - Cache River and all lakes, bays, and bodies of water accessible by boat from the main channel of the Cache or White Rivers.
- November 1 to January 31 - Cache River main channel only.

Only lawful tackle, as specified in the AGFC - Commercial Fishing Regulations, may by used on the refuge. Trotlines and snag lines may be used only in the Cache River main channel. Gill nets and trammel nets may be used on all refuge waters open to commercial fishing in accordance with AGFC regulations. Using seines, wings, and/or leads on the refuge is prohibited.

Wildlife Observation

Cache River NWR provides numerous opportunities for wildlife observation. Hiking one of the designated birding trails, canoeing, boating, or driving one of the many roads are the most common methods of observing refuge wildlife. Birding is one of the most popular forms of wildlife observation on the refuge. Viewing wintering ducks and geese, Bald Eagles, spring and fall migratory songbirds, and possibly an Ivory-billed Woodpecker are common pursuits for local and traveling “birders.” Since the recent discovery of the Ivory-billed Woodpecker, the Cache River NWR has become a serious birder’s destination. Two wildlife observation towers are planned, one on the Howell tract and the other on the Plunkett Farm.

Wildlife Photography

Although no official photography blind is provided, many visitors bring along their cameras for the specific purpose of photographing Arkansas’ wildlife. Waterfowl, butterflies, wading birds, birds of prey, and other species are frequently photographed from refuge lands. The refuge is considering the possibility of installing a photography blind at several locations on the refuge.

Interpretation

The refuge has eight interpretive kiosks located at vehicle/boat entrance points to popular refuge tracts. These kiosks feature refuge maps, brochures, and educational displays concerning the various wildlife species found within the bottomland hardwood habitat on the refuge.

The refuge manager, law enforcement officer, biologist, office assistant, and forester conduct occasional programs that help to interpret the management activities of the refuge.

Environmental Education

Environmental education is conducted by various refuge staff members. Field trips to the refuge, guided tours, in-class presentations, and assistance with special classroom projects are examples of the types of environmental education offered. An environmental education component has also been included in most refuge special events such as wood duck banding or kids fishing rodeo, and off-site

events such as the Arkansas Birding Festival in Clarendon, Arkansas, Arkansas Lick Skillet Days in Brinkley, Arkansas, numerous Ivory-billed Woodpecker events, Earth Days, and Agricultural Education Days. The refuge visitor contact station also displays numerous educational exhibits such as animal skulls, hides, mussel species, mounted fish, and numerous other wildlife mounts.

Wapanocca NWR

The main portion of the refuge is open to the public during daylight hours throughout the year except when icy conditions make it hazardous to travel the levee roads. The 6-mile graveled Nature Drive and the Observation/Fishing Pier are located on the east side of the lake. The land north and east of Ditch 8 is closed December 1 – February 28, as a waterfowl sanctuary for Canada geese. This area is also where the crops are grown as forage for geese. Wapanocca Lake is closed from November 1 – March 15, to avoid disturbance to waterfowl using the lake. A Visitor Contact Station is located in the office building and is open 7:00 a.m. – 4:00 p.m., Monday through Friday (except federal holidays). A concrete boat launch ramp for Wapanocca Lake is located off Highway 77 on the west side of the refuge. Since the saucer-shaped lake is not conducive to bank fishing, three pull-offs/parking areas were developed on the lake side of Old Levee 1 to accommodate anglers without access to boats. The berm along the boat access channel can also be used for bank fishing. A fully accessible Observation/Fishing Pier is located on the east bank of the lake and is popular with the public.

Hunting

Wapanocca NWR offers hunting opportunities for deer, squirrel, rabbit, raccoon, opossum, and Snow Geese. Hunt seasons on the refuge are summarized in Table 5.

Table 5. Hunting opportunities offered at Wapanocca NWR for the 2008-09 season

Deer – Archery	October 1, 2008 – January 31, 2009
Deer – Modern Gun Permit Only	November 8 – 9, 2008
Squirrel – Fall Only	September 6 – October 31, 2008
Rabbit – Fall	September 6 – October 31, 2008
Raccoon and Opossum (Hunt Only)	November 1 – 30, 2008 March 1 – 31, 2009
Snow Geese	After February 28 until end of the state conservation season.

Table 6. Hunter participation and harvest information for Wapanocca NWR's 2007-08 season

2007 Refuge Harvest Information			
Hunt Type	**# Hunters**	**# Hunters Reporting Harvest**	**Animals Reported harvested**
Raccoon (March)	168	27	52
Raccoon (November)	57	20	49
Squirrel (September)	180	55	151
Squirrel (October)	51	25	60
Rabbits (September)	1	1	1 (Swamp Rabbit)
Rabbits (October)	0	0	0
White-tailed Deer – Archery (October)	528	3	3 (2 Buck, 1 Doe)
White-tailed Deer Archery (November)	651	6	6 Buck
White-tailed Deer – Archery (December)	407	1	1 Doe
White-tailed Deer – Archery (January)	231	1	1 Doe
White-tailed Deer – Gun (November)	24	3	3 Buck

The Waterfowl Sanctuary north and east of Ditch 8 is closed to all public entry and use hunting and public entry.

Beaver, nutria, feral hogs, armadillo, and coyote may be taken during any refuge hunt by the use of equipment legal for that hunt.

Nontoxic (waterfowl) shot or rimfire rifles and ammunition only may be possessed and used for all small game hunting. The use or possession of buck shot is prohibited. Gun deer hunters may possess and use muzzleloaders meeting state criteria for deer hunting or shotguns with slugs only. Baiting or hunting over bait, salt or any attractant is prohibited. Dogs are allowed for rabbit, squirrel, raccoon, and opossum hunting.

A hunter information station is located at the entrance to the headquarters building. Hunters are required to sign in/out and record the number of animals harvested. A current signed, free refuge hunting permit (found on the front of the hunt brochure) is required by all hunters participating in any hunting activity

The Round Pond Unit is open to hunting in accordance with state seasons and bag limits. However, it is closed to all migratory bird hunting. A Wapanocca NWR General Hunt Permit is required for all hunts.

Recent harvest information for Wapanocca NWR is presented in Table 6.

Fishing

There is a big demand for fishing on the refuge since there are few public fishing opportunities in this area. Lake rehabilitation was first attempted with the draining of the lake in 1968, and reflooding and stocking of fish in 1969. During the 1970s, the lake was known as “the place” to fish for bream. Bass, crappie, and catfish were also abundant. Fishing visits averaged over 46,000 annually during the period the lake was open (March 15-September 30); visits exceeded 70,000 during one year. With the loss of the fresh water source to flush out the nutrient laden waters, the fisheries resource began diminishing in the 1980s. A total of only 20 fishing visits were recorded in 2004. Rehabilitation of the lake was again attempted with a drawdown beginning in 2004. Refilling began the fall of 2005 and the lake was restocked with bluegill (455,300), red-ear sunfish (95,000), channel catfish (56,250), and Florida largemouth bass (30,300). Fishing in the lake was not reopened until March 15, 2008, in order to allow the fish to grow and maximize reproduction. Efforts to obtain a secondary fresh water source will continue, since without it, the lake is expected to develop eutrophic conditions which once more diminish the sport fisheries resource.

The lake has not yet held full water levels since the restoration, presumably because rainfall amounts (the only water source) have not been sufficient to overcome percolation and evapotranspiration. Fishing currently is poor due to shallow water. A few people have tried fishing in Old Ditch 8 east of Old Levee 1 but had little success. Fishing is permitted on the refuge from March 15-October 31 in Woody Ponds, but this area has not been as heavily visited as the lake. Big Creek and other ditches which flow through the refuge are closed to fishing due to the presence of Dichloro-Diphenyl-Trichloroethane (DDT) and toxaphene at levels of concern. The taking of crawdads for personal use only is permitted. The taking of frogs, mollusks, and turtles is prohibited. The possession or use of yo-yos, jugs, or floating containers, drops or limb lines, trotlines or commercial fishing tackle is prohibited.

Wildlife Observation/Photography

Most of the visitors to the refuge for this activity are locals out to enjoy the scenery and the wildlife they can observe. The refuge is an attraction for avid birders because the varied habitats host a variety of birds. Birding is especially popular in early May during the peak of warbler migration. The 6-mile, well-graveled Nature Drive takes visitors through a wide variety of habitats. It starts at the refuge’s headquarters and ends at the south side of the refuge. Visitors must turn around and come back out the same way. An observation/fishing pier and platform, accessible to mobility-impaired visitors, affords a scenic view of Wapanocca Lake. The use of these areas accounts for approximately 12,000 visits annually.

Interpretation

A visitor contact station, which is open weekdays when the office is open (except Federal holidays), is located within the headquarters building, 1/8-mile east of the main entrance. It provides professionally installed exhibits. There are approximately 500 visits to these exhibits annually.

PERSONNEL, OPERATIONS, AND MAINTENANCE

Central Arkansas National Wildlife Refuge Complex

The four refuges are part of the Central Arkansas National Wildlife Refuge Complex headquartered at Cache River NWR in Dixie, Arkansas, about 16 miles south of Augusta. The refuges are supervised by a Complex project leader and deputy project leader at this location. A number of employees are considered "Complex" employees because their primary duties are spread among the four refuges. These include a forester, biologist, administrative officer, and law enforcement officer. Each of the refuges has on-site staff. A short description of the staffing patterns for each refuge follows.

Bald Knob NWR

The staff consists of a refuge manager, engineering equipment operator, and park ranger - law enforcement. Facilities are limited to a government surplus mobile home used as an office and a small shop/equipment storage area. A farm headquarters, granary, equipment storage building, and shop are used by the cooperative farmer for refuge farming operations.

The refuge generally has adequate vehicles and equipment to meet the routine maintenance needs and can get specialized equipment from the Complex or other refuges if needed.

Big Lake NWR

The staff currently includes a refuge manager and an engineering equipment operator.

The office is a metal building and is located next to a small shop/equipment storage area. The refuge generally has adequate vehicles and equipment to meet the routine maintenance needs and can get specialized equipment from the Complex or other refuges if needed.

Cache River NWR

In addition to staff listed under the Complex discussion above, the staff at Cache River NWR includes an office assistant and two engineering equipment operators. Vacant positions include a refuge manager and natural resource planner.

The office is located in Dixie near Gregory, Arkansas, and is a former residence converted to an office. A large maintenance shop and heavy equipment storage is located behind the office.

Wapanocca NWR

The present headquarters building was constructed in the early 1980s, using Bicentennial Land Heritage Program (BLHP) monies. At that time, there was a permanent staff of five employees and thus the office was constructed to accommodate those numbers. The staff currently includes a refuge manager and an engineering equipment operator.

The buildings constructed using BLHP monies include the headquarters building, 4-bay vehicle storage building, maintenance shop, equipment storage building, and an oil house. A boat house was constructed by force account shortly thereafter. A Butler metal storage building was constructed in 2003.

The refuge has adequate vehicles and equipment to meet the routine maintenance needs and can get specialized equipment from the complex or other refuges if needed.

III. Plan Development

SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

The planning team identified a number of issues, concerns, and opportunities related to fish and wildlife protection, habitat restoration, public use, and management of threatened and endangered species. Additionally, the planning team considered federal and state mandates, as well as applicable local ordinances, regulations, and plans. The team also directed the process of obtaining public input through public scoping meetings, open planning team meetings, comment packets, and personal contacts. All public and advisory team comments were considered; however, some issues important to the public fall outside the scope of this planning process. The team considered all issues that were raised throughout the planning process, and has developed a plan that attempts to balance the competing opinions regarding important issues. The team identified those issues that, in the team's best professional judgment, are most significant to the refuges.

A summary of the significant issues follows.

Bald Knob and Cache River National Wildlife Refuges scoping meetings were held on 9/24 (Bald Knob), 9/25 (Augusta), and 9/26/2007 (Brinkley) with 5, 10, and 7 people attending each meeting, respectively.	
Water Quality	With natural gas production in the Fayetteville Shale Formation increasing, there is potential for contamination of water bodies flowing through Bald Knob NWR from runoff, overflow, or breach of containment reservoirs for drilling fluids and tailings at the well sites. The refuge should develop a water quality monitoring program to document baseline conditions and monitor the water bodies over time. This will allow early detection of potential contamination and provide a baseline for comparison. The monitoring program could include water and sediment sampling, fish tissue analysis, and rapid bio-assessment techniques.
Water Flow Management and Bank Stabilization (Bald Knob and Cache	Numerous streams and bayous flow through the refuges. Due to the many changes in the landscape coupled with natural fluvial geomorphic processes, bank erosion and channel migration have and will continue to occur. In instances where these processes will not threaten buildings, bridges or other structures, it is recommended that they be allowed to take their natural course. If action is required to stabilize a bank, it is recommended that bioengineering be employed whenever possible. Expertise in bioengineering is available within the Service, state resource agencies, and local NGO's. Riparian vegetation, which is instrumental in strengthening and stabilizing banks, should be protected (and restored where absent). There is a section of eroding streambank on Bayou DeView in the Bank of Brinkley tract that was stabilized by using

Bald Knob and Cache River National Wildlife Refuges scoping meetings were held on 9/24 (Bald Knob), 9/25 (Augusta), and 9/26/2007 (Brinkley) with 5, 10, and 7 people attending each meeting, respectively.	
	rock rip rap. This is undesirable for several reasons: (1) This material is not native to the area; (2) it is aesthetically displeasing; (3) it is expensive; and (4) if not properly installed will incur scour on the ends, thus requiring additional stone. In this particular instance, the streambank did not have trees or shrubs and a minor refuge road was close to the eroding bank. A possible solution to the problem would have been to move the road, protecting the toe of the streambank with natural materials while reshaping the bank and establishing woody vegetation. The use of bioengineering has been documented and has proven successful. Employing these techniques here will benefit fish and wildlife resources and make the refuge a showcase for innovative management.
Land Acquisition	Expand acquisition boundary to allow conservation and management of larger blocks of habitat for wildlife (e.g., swallow-tailed kite and neotropicals). Increase connectivity and expand from narrow corridor to larger blocks to increase interior habitat.
	Service should acquire private tracts to connect Bald Knob NWR to Hurricane Wildlife Management Area along Mingo Creek.
	On Cache River NWR, look at acquisition of sites outside 10-year floodplain to diversify habitats for biodiversity/species richness.
	Continue to acquire lands for Cache River NWR from willing sellers.
	Exchanges of refuge lands should be announced to the public.
	I support increasing refuge holdings and concentrate on acquiring lands to provide greater continuity of refuge ownership.
	Raft Creek and Zogt Hill (Rogers Bend) tracts would be better administered by Hurricane WMA. Bald Knob NWR?
	Move the acquisition boundary to include White River from Georgetown South.
Habitat Management	Research the potential role of fire in ecosystem management.
	Replanting old agriculture fields is a good idea.
	Controlling kudzu is beneficial.
	Forest management to benefit wildlife is a good practice.

Bald Knob and Cache River National Wildlife Refuges scoping meetings were held on 9/24 (Bald Knob), 9/25 (Augusta), and 9/26/2007 (Brinkley) with 5, 10, and 7 people attending each meeting, respectively.	
	Put in food plots (peas, turnips, clover, etc.) on Cache River NWR.
	Unharvested milo prevents seeing deer during hunts.
	Coop farming is a good way to provide wildlife food.
Hunting	Expand modern gun deer season (different times of the year) on Bald Knob NWR.
	Mow strips in reforestation areas for game bird habitat and hunter access.
	Allow the public to trap beaver. A special use permit could be required.
	Continue no trapping on the refuge except for beaver control.
	Allow all trapping but especially beaver by the public as the state does.
	Increase the gun hunt from 5 to 10 days.
	Spread the deer hunting days across the season.
	Normalize antler restrictions to be compatible with areas off the refuge.
	I would like no antler restriction.
	Limit turkey hunting to areas that have the highest numbers and close the other areas. Do surveys to determine turkey populations.
	Open the Dixie Waterfowl Sanctuary to hunting half-day, two days a week.
	Allow an all-day duck hunt on the last 3 days of the season, including the sanctuaries, which is comparable to the state.
	Make waterfowl hunting start times more consistent with White River NWR.
	Eliminate steel shot provision for small game hunting. Steel shot decreases killing effectiveness.
	The Plunkett Farm Sanctuary should not be closed during the quota gun hunts.
	Increase the quota gun hunt to 10 days or two weekends. Most only get to hunt on Saturday and Sunday, because many work through the week.
	Have more than a 5-day deer season.
	Allow hunting with dogs beginning November 15.
	Dove hunting should follow state seasons.

Bald Knob and Cache River National Wildlife Refuges scoping meetings were held on 9/24 (Bald Knob), 9/25 (Augusta), and 9/26/2007 (Brinkley) with 5, 10, and 7 people attending each meeting, respectively.	
Camping	We need camping areas on Cache River NWR.
	Allow camping on the refuge from 260 and north to Cavel.
	If the extent of the refuge is 70 miles, there should be 4 to 5 primitive campsites.
	Every tract should have camping even if it is only primitive sites.
	Add camping areas to the George Tract and Broadwater tract.
Access	Mow around long field behind Fitzwater so people can go further back.
	Allow additional access on Cache River NWR. More access to larger tracts between Highways 64 and 260 is desired. Reestablish previous roads (before refuge acquired) for access.
	Provide a continuous gravel surface of access roads in the George Tract and repair mud holes.
	Mow wider areas on roadsides on Beulah tract for safe travel and to decrease vehicle damage.
	Allow the use of ATVs to retrieve deer harvested by hunters from 12 to 2 o'clock without firearms.
	Only allow ATV use based on age or disabilities. No ATV use if not impaired.
	Need parking areas around Highway 260 (long field).
	Extend the Walker Access Road to AGF boundary.
	Remove stumps and cypress knees from Holder Access and Cache Bayou Access.
	Provide access road north of Cavell on East side.
	Improve access to landlocked areas.
	Make all landlocked areas sanctuaries (Lower Horseshoe) to prevent unfair advantages for access by adjacent landowners. Unless everyone can access the tract, it should be closed to public use.
	There should be more public involvement on road decisions (Biscoe Bottoms).
Wildlife Observation and Photography	Develop and provide unimproved foot trails in non-floodprone sites for birding opportunities. Delineate these trails on maps so visitors can easily find them.
	Provide maps of pedestrian trails/access for the public to engage in wildlife observation and photography.

Bald Knob and Cache River National Wildlife Refuges scoping meetings were held on 9/24 (Bald Knob), 9/25 (Augusta), and 9/26/2007 (Brinkley) with 5, 10, and 7 people attending each meeting, respectively.	
Special Programs for Youth and Elderly	Plan some events for the elderly.
	Provide more youth events (deer, duck, and dove hunts) at Bald Knob and Cache River NWRs. (2 comments)
	Have a 2-day Christmas deer hunt for youths. Add a dove hunt for youths.
	Implement a youth turkey hunt.
	Continue annual fishing derby at Cache River NWR. (2 comments)
	Generate shorebird programs for local schools to use for environmental education. (Bald Knob NWR)
Staffing	Add a visitor services specialist or interpreter to the refuge staff.
	Additional staff to properly maintain roads to reduce safety hazards is needed. An example would be the George Tract.
Communication with the Public	Notify all permit holders of meetings such as these (CCP scoping meetings).
	Make sure all public meetings are advertised in all local papers surrounding Cache River NWR.
	Have brochure boxes at all kiosks and keep them filled.
Law Enforcement	Increase law enforcement presence on Cache and Bald Knob NWRs by hiring more refuge officers.
Facilities	Replace current refuge office (old trailer) on Bald Knob NWR to better serve public contact and visitation services.
	Expand the equipment shed, storage facilities, and shop work area on Bald Knob NWR.

Big Lake and Wapanocca National Wildlife Refuge scoping meetings were held on 2/26/2007 (Manila) with 10 people attending and on 2/27/2007 (Marion) with 2 people attending.	
Public Use	We need a crawdad day at the refuge.
	Big Lake NWR is a resting area for ducks but a lake for fishing too. My grandfather was a commercial fisherman for 30 years on Big Lake NWR and I have fished it since I have been old enough. I have a 14-year-old son who I hope is able to do the same.
	I would like to see more opportunities for kids to enjoy Big Lake NWR, such as a youth deer hunt and youth turkey hunt. The kids are our future.

Big Lake and Wapanocca National Wildlife Refuge scoping meetings were held on 2/26/2007 (Manila) with 10 people attending and on 2/27/2007 (Marion) with 2 people attending.	
	Bowfishing would become popular if allowed on the lake and could help control the rough fish population.
	The refuge needs a walking and hiking trail enhancement, possibly a boardwalk.
	Add boat ramp for access to Ditch 81.
	Do not allow duck hunting on the refuge.
Water Management	Keep lake full of clean water where possible. Do not drawdown for any reason.
	We need a water control structure on south end of the lake. This would promote and/or allow water levels to be raised or lowered for both ducks and fish. This would also allow for channelization through the lake.
	Raise the water level 2 – 4 ". The lake has become at least 1 – 2 ft. shallower in last 20 years.
	Drawdowns should be controlled by the refuge to prevent muddy water and silting within the refuge.
	Dredge the channel from north end of big opening to south dam.
	Put water control structure on north end of ditch 28.
	I would like to see the problem with the lake silting in addressed. I am aware the Service has an agreement with the Corps to manage the water when drainage from Missouri is necessary, but the Service needs the authority to divert muddy water when needed. If something is not done, Big Lake will not be here for our children and grandchildren. This should the number one priority for the Service.
	I would like to see a decrease in the siltation of Big Lake. I have seen several feet of siltation which has completely filled in areas of the lake that at one time were prime fishing areas. If nothing is done, my grandchildren will not be able to enjoy the lake the way I have the last 40 years.
	I would like to see a major dredging operation done on the lake or at the very least, the main channel.
Habitat Management	Adding food plots in areas that are available would benefit deer and upland game.
	To save on mowing, add wildflower restoration on west side of the levee.
	Plant millet in shallow water areas for wintering waterfowl.
Land Acquisition	Increase refuge land if possible.

Big Lake and Wapanocca National Wildlife Refuge scoping meetings were held on 2/26/2007 (Manila) with 10 people attending and on 2/27/2007 (Marion) with 2 people attending.	
	I would like to see land bought as it comes available around and south of the lake. This would allow cover and habitat around the lake when floods occur. South of the lake, between the levee system, it would expand the refuge and add valuable cover and public enjoyment of the area the way it was before the clearing occurred.
Law Enforcement	I would like to see more enforcement on the area since there is a problem with night poaching and overharvest, mainly fish during the summer. Littering is one of the big problems that needs attention.

Wilderness Review

Refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process. The results of the wilderness review are:

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 Bald Knob, Big Lake, Cache River, and Wapanocca NWRs were reviewed for their suitability in meeting the criteria for wilderness, as defined by the Wilderness Act of 1964.

If Applicable - No lands in the refuge were found to meet these criteria. Therefore, the suitability of refuge lands for wilderness designation is not further analyzed in this Draft CCP/EA.

NOTE: Big Lake NWR contains 2,144 acres designated as a unit of the National Wilderness Preservation System in 1976.

IV. Management Direction

INTRODUCTION

The Service manages fish and wildlife habitats and considers the needs of all resources in decision-making. But first and foremost, fish and wildlife conservation assumes priority in refuge management. A requirement of the Improvement Act is for the Service to maintain the ecological health, diversity, and integrity of refuges.

Described in this chapter is the proposed CCP for managing the refuges over the next 15 years. This proposed management direction contains the goals, objectives, and strategies that will be used to fulfill the purposes of these refuges and achieve the refuge vision.

Three alternatives for managing the refuges were considered: Alternative A – Current Management Direction (No Action); Alternative B – Minimal Management, and Alternative C – Enhanced Habitat and Public Use Management. Each of these alternatives is described in the Alternatives section of the Environmental Assessment (Section B of this document). The Service chose Alternative C as the proposed management direction (Proposed Alternative).

With adequate staffing and budget, implementing the proposed alternative will result in strategic landscape conservation through land acquisitions from willing sellers, and intensifying and expanding current programs of moist-soil, scrub-shrub, and grassland management for waterfowl, shorebirds, other migratory birds, and other native species of wildlife. In addition, the refuges will intensify forest management to enhance forest health and wildlife habitat and will continue to implement afforestation and reforestation, enhance current wildlife management based on sound fish and wildlife management principles, provide interpretation and environmental education services for the public, and furnish additional law enforcement for protection of resources and the public.

Public uses can be allowed if they are appropriate and Improvement Act compatible with the mission of the Refuge System and refuge purposes. The identified wildlife-dependent public uses are to be given priority consideration, if found compatible. These so-called priority public uses are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

VISION

Refuges within the Central Arkansas NWR Complex will be conserved and managed as havens for migratory birds, especially waterfowl, in a region of the continent critically important for their survival. Working with partners, the Service will protect, restore, and enhance bottomland hardwood forest ecosystems, wintering waterfowl habitats, and other fish and wildlife habitats for the benefit of the American public. The Service will provide opportunities for the public to use and enjoy these refuges in a way that safeguards their values and promotes awareness of their importance.

GOALS, OBJECTIVES, AND STRATEGIES

The goals, objectives, and strategies presented in this Draft CCP/EA are formulated in the context of applicable statutory authorities, federal regulations, and Departmental and Service policies. They represent the Service's response to the issues, concerns, and needs expressed by the planning team, the refuge staff, partners, and the public and are presented in hierarchical format. Projects associated with the various strategies are identified in Chapter V, Plan Implementation.

These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the Improvement Act, the mission of the Refuge System, and the purposes and vision of the Central Arkansas NWR Complex. The time scale for the implementation and accomplishment of the following goals, objectives, and strategies is the 15-year planning cycle for this Draft CCP/EA.

BALD KNOB NATIONAL WILDLIFE REFUGE

NOTE: All goals, objectives, and strategies described below for Bald Knob NWR are set in the time context of the 15-year planning cycle of this Draft CCP/EA.

FISH AND WILDLIFE POPULATION MANAGEMENT

Bald Knob NWR Goal 1: Manage and protect migratory birds and native wildlife populations on Bald Knob NWR to fulfill the purposes for which it was established and to contribute to the mission of the National Wildlife Refuge System.

Discussion: Each refuge in the Complex was established for the purpose of providing for the needs of migratory waterfowl. Bald Knob NWR was created to protect and furnish feeding and resting areas for migrating waterfowl. Acquired as part of the North American Waterfowl Management Plan, this refuge provides a winter home for large concentrations of many species of ducks and geese, although it was purchased specifically for pintail management due to its identification as a major staging and wintering area for this prairie species.

Bald Knob NWR Objective 1-1: Migratory Waterfowl

Provide habitats on Bald Knob NWR sufficient to meet the habitat and population goals of the North American Waterfowl Management Plan (NAWMP) as stepped-down through the Lower Mississippi Valley Joint Venture (LMVJV).

Discussion: The Mississippi Alluvial Valley (MAV) is an important ecoregion for migrating and wintering ducks and geese in North America. Bald Knob NWR provides important foraging and resting (sanctuary) habitats within the MAV for these waterfowl and serves an integral role in accomplishing goals set forth in the NAWMP.

Concern over waterfowl population declines in the 1980s resulted in establishment of the NAWMP, which focused the attention of federal, state, and private conservation groups on critical wintering and breeding areas. The LMVJV, which encompasses all four refuges in the Complex, was selected as one of the wintering habitat focus areas. One of the first tasks faced by the LMVJV was to develop a model or decision tool for determining how much habitat was needed, and a method for relating this objective to the population goals of the NAWMP. The solution was to consider wintering areas as responsible for contributing to the spring breeding population goals of NAWMP, proportional to the percentage of ducks historically counted in wintering areas (Loesch et al., 1994, Reinecke and Loesch 1996). In order to contribute ducks to spring breeding populations, wintering areas must provide sufficient habitat to ensure adequate winter survival. To quantify winter habitat requirements, the LMVJV had to identify limiting factors and made an assumption that foraging habitat was the most likely factor to limit waterfowl populations in the LMV (Reinecke et al. 1989). The process of relating habitat objectives for individual management areas to overall habitat objectives for the LMV involved several steps (Biological Review for Bald Knob and Cache River NWRs, USFWS 2008). Step-down objectives were established for Bald Knob NWR (Table 7). Duck-energy day (DED) objectives were calculated by multiplying the acreage objective by the assumed DED standard developed by the LMVJV for that habitat type.

Table 7. Bald Knob NWR - Current migrating and wintering waterfowl foraging habitat objectives established by the LMVJV

Habitat	Objective[1] Acres (DED)[3]	Current Capability[2] Acres (DED)[4]	(+ or -) Acres (DED)
Moist-soil	500 (693,000)	660 (1,232,880)	+160 (+539,880)
Bottomland Forest	800 (100,800)	800 (152,800)	0 (+ 52,000)
Unharvested Crop	1,250 (15,777,500)	747 (15,662,526)	-503 (-114,974)
Harvested Crop	575 (386,975)	2,843 (286,465)	+2,268 (-100,510)
Total	**3,125 (16,958,275)**	**5,050 (17,334,671)**	**+1,925 (+376,396)**

[1]Acreage and DED objective provided by the LMVJV office.
[2]Current acreage and DED capability (has levees and water control structure, some have pumping capability) provided by refuge staff.
[3]DED estimates, calculated by using standard DED figures provided by LMVJV.
[4]Updated DED estimates adopted by the LMVJV Waterfowl Working Group in June 2006: moist-soil, 1,868 DEDs/ac; bottomland hardwood, 191 DEDs/ac; unharvested crop, 14,061 DEDs/ac (estimate based on actual acres of various grain crops left unharvested and flooded during the winter period); harvested crop, 287 DEDs/ac (estimate based on actual acres of various harvested grain crops flooded during the winter period).

Habitat objectives are based on food production and acres by habitat type for the complex of habitats including harvested and unharvested cropland and moist-soil areas. Each of these habitats is required to provide an important part of the food resources (i.e., native weed seeds, small grains, and invertebrates) required by waterfowl wintering in the LMV. Agricultural grains are high in carbohydrates, or energy (i.e., “hot foods”), needed by waterfowl to maintain body temperature during cold periods of winter. Native weed seeds (moist-soil seeds) and invertebrates provide high levels of protein and other nutrients used by waterfowl to complete important life cycle functions during winter such as molting, storing energy (fat) reserves, and improving overall body condition for the return migration to the breeding grounds and egg-laying. A variety of both natural and agricultural foods provide a diversity of nutrients for waterfowl with temporally varying nutritional requirements. Because of the high production of agricultural crops, unharvested grain provides much higher DED values per acre than natural seeds. For example, unharvested corn is estimated to provide 28,591 DEDs per acre, whereas native plant seeds found in moist-soil habitat are estimated to provide 1,868 DEDs per acre, and bottomland hardwoods with a 40 percent red oak overstory component are predicted to provide 156 DEDs per acre (Table 8).

Flooded shrub swamps and bottomland forests have some value as foraging habitats but may play a more important role by isolating birds during pair bonding, providing thermal protection on cold, windy days, and providing escape cover. It is critical that each component of habitat (i.e., agricultural grains, moist-soil seeds, and hard mast in wooded swamp/bottomland forests) be available if all the foraging and habitat needs of wintering waterfowl are to be met.

Table 8. Carrying capacity of selected foraging habitats of dabbling ducks wintering in the LMRJV[1]

Habitat type	Carrying capacity (duck energy days/acre)
Moist-soil	1,868
Unharvested cropland	
Rice	23,833
Soybean	4,677
Milo	18,046
Corn	28,591
Millet	5,203
Harvested cropland	
Rice	138
Soybean	36
Milo	480
Corn	505
Bottomland Hardwoods	
30% red oak	109
40% red oak	156
50% red oak	203
60% red oak	250
70% red oak	297
80% red oak	345
90% red oak	392
100% red oak	439

[1]*These figures were recently updated by the LMVJV Waterfowl Working Group, and differ slightly from the values used by the LMVJV in the original planning process to develop waterfowl foraging habitat step-down objectives.*

High waterfowl harvest rates and hunting activity in Arkansas make a sanctuary function a key role in waterfowl management for Arkansas refuges. Activities such as maintaining body temperature, searching for food and roost sites, avoiding disturbance, molting, courtship, and pair bonding are energy consuming activities for waterfowl in winter. The assumed interaction between disturbance, energetic costs, and low survival can at least partially be mitigated by sanctuary where waterfowl can rest and perform these activities with a minimum of interruption. Sanctuary or refuge is critical for waterfowl to conserve energy to survive the winter period and conduct activities preparatory to perform other life functions, particularly reproduction.

Due to its strategic location in the heavily hunted MAV, coupled with the ability of this refuge to manage for a concentrated source of high-quality waterfowl food resources, Bald Knob NWR provides a critically important waterfowl sanctuary. This function must remain in place in order to provide areas free from disturbance to wintering waterfowl.

Strategies:

- Develop and implement a step-down water management plan to include flood dates and drawdown dates for all water management units.
- Provide flooded habitat (100-200 acres) for early migrating waterfowl, such as teal and pintail, beginning no later than September 1, and at least 50 acres for fall-migrating shorebirds (July through October), thus integrating water management for shorebirds and early migrating waterfowl to the highest degree possible.
- Flood additional acreage from November through December to provide food resources for wintering waterfowl.
- By mid- to late-January, slowly decrease water levels in some impoundments to concentrate invertebrates for spring migrants, and continue this practice into mid-April.
- Monitor waterfowl numbers and habitat use by species annually to determine whether refuge and landscape-level (e.g., LMVJV) objectives are being met, and adapt habitat management as practical to meet objectives.
- Seek improved management strategies to increase food production and waterfowl use of food resources as practical.

Bald Knob NWR Objective 1-2: American Woodcock

Enhance American Woodcock habitat to contribute to the objectives of the American Woodcock Management Plan.

Discussion: American Woodcock are migratory game birds that occur throughout the forested portions of the eastern United States. Bald Knob NWR is within the Central Region woodcock management unit known as the Central Region. Woodcock populations in this region have declined 19 percent since 1968, probably due to land use changes associated with land conversion and the maturing of forest habitats.

In 1990, the American Woodcock Management Plan (U.S. Fish and Wildlife Service1990*)* was completed, setting an objective to protect and enhance wintering and migration habitat on public lands to increase woodcock carrying capacity. The plan also set objectives to inventory and monitor woodcock habitat and develop management demonstration areas.

Strategies:

- Assess and inventory woodcock habitat on the refuge.
- Develop and implement habitat management plans that provide preferred habitat for woodcock foraging and roosting, including thickets with high vertical stem density in the understory and fairly open ground cover on spongy wet soil (generally within 0.5-mile of openings), young afforestation areas, and agricultural fields.
- Create diurnal habitat in existing forest stands through thinning and patch clearcuts that also benefit other high priority bird species.
- Create and maintain preferred nocturnal habitat in wet agricultural fields (not fall disked) and wet “old field” (afforestation site) or grassland habitats of greater than 5 acres with exposed soil and patchy cover 1 to 3 feet in height.
- Manage openings of greater than 5 acres near areas of good diurnal habitat to provide nocturnal foraging habitat for woodcock.
- Take advantage of rights-of-way and other permanent forest openings to create woodcock habitat.

- Conduct evening flight counts, spotlight counts, or flush counts at least twice monthly from mid-November to mid-February, to estimate population density, migration chronology, and nocturnal habitat use.
- Restrict or eliminate fall plowing of crop fields since woodcock feed primarily on earth worms that are greatly reduced by late season plowing.

Bald Knob NWR Objective 1-3: Shorebirds

Provide fall (southbound) migration habitat for shorebirds to contribute to the objectives set forth in the U.S. Shorebird Conservation Plan, Lower Mississippi Valley/West Gulf Coastal Plain Shorebird Management Plan, and by the LMVJV.

Discussion: Bald Knob NWR has the unique feature of a water control infrastructure that enables precision water management. This system has been used in recent years to manage water levels for shorebirds to create mudflats during the most critical time of year for shorebird migration, occurring in late summer and early fall. Shorebird management at the refuge began in 1999, and currently about 150 acres are managed for mudflats. Bald Knob NWR has become one of the most popular birding areas in the state, drawing in birders for the exceptional number of shorebirds that occur at the refuge during spring and late summer/fall. Several shorebird species found on the refuge are included in the Arkansas State Action Plan as Species of Greatest Conservation Need, including Piping Plover and Buff-breasted Sandpiper. Mudflat habitat also provides foraging opportunities for several species of wading birds and waterbirds, including Least Tern, Roseate Spoonbill, Tri-colored Heron, and Wood Storks.

According to the regional U.S. Shorebird Conservation Plan, the main limiting factor for migrating shorebirds is availability of foraging habitat. In the LMV, this occurs during the southbound migration (late summer-early fall) when water availability is limited. One goal is to provide mudflat habitat for southbound migrating shorebirds on public lands during this time period. At Bald Knob NWR, continued mudflat availability within the context of the ongoing cooperative farming program is needed for shallow feeding shorebird species.

Strategies:

- Maintain water in impoundments during spring and early summer to prevent vegetation growth.
- Drawdown water slowly in impoundments beginning in June until some mudflats are exposed, allowing natural evaporation to continue through September and concentrate invertebrates.
- Monitor shorebirds two to three times per week from June through September (using volunteers or other trained observers) to meet objectives of the LMVJV Shorebird Monitoring Program.
- Record water depths, vegetation, timing of flooding and drawdowns, and species of shorebirds utilizing various habitats to evaluate success in meeting objectives, and adjust management actions as warranted (i.e., adaptive management).
- Monitor shorebird responses to habitat conditions and management, and evaluate underlying assumptions of the regional Shorebird Conservation Plan by estimating the number of birds moving through the area and the rate and duration of migration.

Bald Knob NWR Objective 1-4: Colonial Waterbirds/Wading Birds

Provide critical habitats for long-legged wading birds to contribute to objectives set forth in the North American Waterbird Conservation Plan.

Discussion: Bald Knob NWR provides habitat for breeding and wintering colonial waterbirds in shallow water areas and forested wetlands. Although this group of species is not a major priority for the refuge, management for shorebirds and waterfowl also provides foraging habitat for wading birds. Existing rookeries are surveyed annually and new rookeries are noted. Surveys should be continued to identify rookery sites, record breeding bird numbers, and estimate production. Rookery sites should be protected from disturbance, if necessary.

Strategies:

- In association with management for shorebirds, provide areas of shallow water and mudflat habitat that also will serve as habitat for wading birds.
- Perform surveys to identify rookery locations, provide rookeries protection from disturbance during the breeding and fledging period, and monitor production.

Bald Knob NWR Objective 1-5: Marshbirds

Provide high-quality breeding marshbird habitat where possible in conjunction with meeting waterfowl habitat requirements.

Discussion: Loss of freshwater emergent wetlands has occurred throughout the southeast as development pressures have increased. The King Rail is thought to have been seriously impacted and there is great concern over inland numbers of this secretive marshbird. The Least Bittern is another species of high concern. Marshbirds occurring on Bald Knob NWR rely on emergent vegetation, thus it is recommended that these species be taken into consideration when managing moist-soil units for wintering waterfowl and Wood Duck brooding habitat.

Strategies:

- Implement appropriate surveys and manage for marshbird species, including King Rail and Least Bittern, as feasible within the context of management for wintering waterfowl and Wood Duck brooding habitat.
- Identify marshbird habitat on the refuge and set back succession by mowing, disking, or herbiciding every 4 to 7 years to produce 40 to 80 percent coverage of emergent vegetation with little to no woody vegetation. Control willows, cottonwoods, and button bush on these sites with herbicide if they are too large to cut with a rotary chopper.
- Implement water management restoration projects where feasible to provide cattails and other emergent vegetation.
- Continue to survey secretive marshbirds, using playback calls during May and June in sites surveyed by Budd and Krementz in 2005-06, to determine species occurrence and population trends. Survey additional points as necessary to determine habitat use/preference. Use results of surveys to adjust habitat management activities as needed (i.e., adaptive management).

Bald Knob NWR Objective 1-6: Forest Breeding Birds

Provide sufficient habitat through forest restoration and management to support priority forest species in the Mississippi Alluvial Valley (Bird Conservation Region 26).

Discussion: Recently, the LMVJV's Forest Resource Conservation Working Group has been working on the development of "Desired Forest Conditions" to benefit priority wildlife species in forested wetlands. Attaining desired forest conditions as outlined in the report *"Forest Restoration, Management, and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife Habitat"* will provide habitat to benefit a wide array of priority wildlife species, including high-priority breeding forest birds, such as Acadian Flycatcher, Prothonotary Warbler, Red-headed Woodpecker, Wood Thrush, and Kentucky Warbler. In brief, this report reviews the habitat needs of priority wildlife species and recommends "Desired Forest Conditions" at the landscape- and stand-level to enhance wildlife habitat. Additionally, the report provides several recommendations for improving reforestation and forest management activities. In addition to providing benefits to various priority forest birds, where possible, forest stand treatments should: (1) Stimulate the production of vegetation at the ground, understory, and midstory layers of the forest by creating openings of various sizes in the canopy to provide sunlight to the forest floor; (2) encourage development of emergent trees that rise above the predominant forest canopy; (3) retain large diameter class trees; (4) provide large standing, dead or dying trees; (5) contribute coarse woody debris to the forest floor; and (6) retain small diameter cavity trees. Forest management would provide benefits to priority Partners in Flight (PIF) forest birds, as well as a suite of priority wildlife species dependent upon forests.

In April 2000, refuge personnel established 41 permanent plots in the Mingo Creek Unit for conducting non-game breeding bird surveys to evaluate breeding bird and winter resident usage of forest habitat. The evaluation protocol was designed to correlate seasonal bird usage to forest habitat type to determine the "Desired Forest Conditions" discussed above. The survey points are located approximately 0.2-mile between stations. At each station, personnel conducted a habitat/vegetation inventory comprising overstory, midstory, and ground cover to determine habitat structure and evaluate possible correlations with bird distribution and habitat use. Counts at each location last 10 minutes with birds recorded separately for each of the three distinct time intervals of 0-3 minutes, 4-5 minutes, and 6-10 minutes. Also, the distance bands in which birds are recorded are defined as 0-25 meters, 25-50 meters, 50-100 meters, and > 100 meters with flyovers recorded separately. All birds seen or heard are recorded by distance and time.

The most common birds recorded include the Carolina Wren, Tufted Titmouse, Northern Cardinal, Blue-gray Flycatcher, Indigo Bunting, Yellow-billed Cuckoo, American Crow, and Carolina Chickadee. At least 50 different residents are recorded on any given year.

Over the past several years, reforestation goals have been met on Bald Knob NWR and additional new reforestation is unlikely unless land acquisition occurs. However, several modifications in management are recommended to benefit numerous non-game bird groups. Active forest management provides the opportunity to improve currently forested acreage to provide better habitat for high priority species.

Forest restoration may be considered in areas where land acquisition is a possibility. In the past, there has been discussion of potentially acquiring 5,000 acres that would connect Bald Knob NWR to the state-owned Henry Gray/Hurricane Lake Wildlife Management Area. If this opportunity arose, forest restoration in areas adjacent to forest blocks would increase forest block size to benefit more area-sensitive breeding birds and might reduce potential depredation and parasitism by Brown-

headed Cowbirds. If additional forest restoration is considered, then placement adjacent to current blocks would provide, for a window of time, habitat for early forest successional species such as Northern Bobwhite and for forest-edge species such as Painted Buntings and Bell's Vireo. Over time, restoration would increase the current forest block size and improve connectivity.

Strategies:

- Maintain and increase where feasible structural habitat diversity in the overstory, mid-story, understory, and ground cover layers for priority breeding bird species with appropriate forest management techniques.
- Implement forest management techniques where feasible to provide and maintain more vertical vegetation structure to benefit forest birds, including species such as Swainson's Warbler, American Woodcock, Kentucky Warbler, and Wood Thrush.
- Where feasible, maintain at least 70 percent forested cover within a 10-km (6-mile) radius to reduce species vulnerability to nest predation and parasitism.
- Maintain scattered patches of understory to increase survivorship for understory birds in their first year and provide foraging opportunities for transient migrants in spring and fall.
- Continue forest restoration in newly-acquired areas and link to other blocks of forest as feasible to increase block size and provide future habitat for forest bird species.

Bald Knob NWR Objective 1-7: Scrub-shrub or Early Successional Birds

Provide habitat, through forest restoration and development and maintenance of early successional habitat, for high-priority scrub-shrub species in the Mississippi Alluvial Valley (Bird Conservation Region 26).

Discussion: Reforestation efforts provide a recurring source of early successional habitat that benefits priority bird species dependent on such habitat. Where feasible, select sites to be maintained as scrub-shrub habitat through periodic disturbance. These areas should be allowed to revert to scrub-shrub habitat containing shrub, grass, and forbs species. Maintenance will be required about every 5 years through prescribed fire, flooding, mowing, or disking. Early successional species that would benefit include Bell's Vireo, Field Sparrow, Painted Bunting, Loggerhead Shrike, and Northern Bobwhite.

Strategies:

- Provide early successional habitat through reforestation of newly acquired areas.
- Identify and maintain appropriate areas in desired early successional conditions, using techniques such as mowing, disking, or prescribed fire.

Bald Knob NWR Objective 1-8: Grassland Birds

Provide habitat, through current moist-soil management practices and management of old fields, for high-priority grassland birds in the Mississippi Alluvial Valley (Bird Conservation Region 26).

Discussion: Many high-priority grassland species are more prevalent at Bald Knob NWR during their migration and in winter than during their breeding season. These species, including LeConte's Sparrow, Lark Sparrow, Grasshopper Sparrow, and Loggerhead Shrike, use rice fields, moist-soil units, and old fields and therefore benefit from ongoing moist-soil management for

waterfowl and marshbirds. Old fields and moist-soil units also provide winter habitat for Northern Harrier, Short-eared Owl, and Sedge Wren.

Strategies:

- Maintain moist-soil habitat that also benefits a variety of grassland birds.
- If feasible and desirable, create and maintain suitable grassland bird habitat on select old fields and newly acquired agricultural fields.

Bald Knob NWR Objective 1-9: White-tailed Deer

Maintain a healthy deer herd, with a balanced sex and age structure at a level consistent with long-term habitat capability, to prevent degradation of habitat important to priority species.

Discussion: Although not a federal trust species, white-tailed deer are of great importance to the public for observation/photography and hunting. Habitat on the refuge consists of a mixture of farm fields, afforestation, moist-soil impoundments, and bottomland hardwood forests, which create a mosaic of different habitats that provide excellent cover and forage for deer and other wildlife. Most refuge management actions aimed at priority species, such as migratory birds, also provide direct benefits for deer. Deer numbers must be held at appropriate levels through hunting.

Deer appear to be relatively common on Bald Knob NWR based on general observations, previous years' harvest data, and spotlight surveys. In the early 2000s, a partial deer herd health check was conducted by the Southeastern Cooperative Wildlife Disease Study (SCWDS) on the refuge. This survey suggested that the deer population was healthy and below carrying capacity. A new herd health check was conducted in September 2007, and indicated that deer are in excellent physical condition with the population below carrying capacity. Harvest over the last few years, based on refuge and AGFC check station reports, has been low. Archery season is open from October to the end of February and an either-sex harvest is allowed. An either-sex, muzzleloader deer hunt is open to the general public for nine days during October and there is a two-day, either-sex, Quota Gun Deer Hunt in early November. The Mingo Creek Unit is closed to deer hunting during the general gun hunt for deer. Specific population objectives for the deer herd on the refuge have not been established.

Strategies:

- Use public hunting as the management tool to maintain deer numbers within carrying capacity of refuge habitats.
- In coordination with AGFC, set harvest objectives, monitor harvest and population trends, and adjust harvests to maintain deer numbers at desired levels.
- Collect biological harvest data at self-check and manned check stations during all hunts in order to collect sufficient data to make inferences about the deer population.
- Assess herd condition/densities relative to carrying capacity by analyzing harvest data and interpreting density-dependent factors such as age-specific weights, antler characteristics, and reproduction.
- Determine current herd condition/densities relative to carrying capacity and past disease history every five years through herd health checks conducted and analyzed by SCWDS.
- Estimate population density or population index by conducting and analyzing annual spotlight surveys and monitoring long-term trends.
- Evaluate age structure and buck:doe ratio of deer population by analyzing and interpreting harvest data.

Bald Knob NWR Objective 1-10: Eastern Wild Turkeys

Conduct active habitat management that incidentally results in enhanced habitat for Eastern Wild Turkeys and provides quality recreational opportunities.

Discussion: Eastern Wild Turkeys are popular with the public for wildlife observation/photography and for hunting. Turkeys are generally restricted to large, contiguous blocks of forests, partly because those are most likely to contain a variety of habitats. Such large blocks of forests are limited on Bald Knob NWR, as are turkeys. The Mingo Creek Unit, approximately 2,000 acres of mature hardwoods which is connected to an even larger forest block on Hurricane Lake WMA, contains the majority of the refuge's turkey habitat. Turkeys also utilize young afforestation sites and open fields. Hunting for turkeys is allowed only on the Mingo Creek Unit and is restricted to fall archery hunting.

Strategies:

- Implement an active forest management program on the refuge, with consideration given to turkey habitat needs where compatible with forest and open land management for trust species.
- Set harvest objectives, monitor harvest, and adjust as necessary and feasible in coordination with AGFC Turkey Biologist.

Bald Knob NWR Objective 1-11: Furbearers

Maintain healthy populations of furbearers consistent with habitat and population management objectives for priority species, and control nuisance animals when necessary.

Discussion: Raccoon, mink, muskrat, opossum, coyote, bobcat, beaver, river otter, red fox, gray fox, and striped skunk are thought to be common on the refuge. Raccoon are well-adapted to all existing habitats, and opossum, coyote, fox, and bobcat are more associated with drier forests, and afforestation sites. Muskrat, river otter, beaver, nutria, and mink are associated with the more permanently inundated wetlands and bayous. Little or no formal data are available to provide population estimates for these species on the refuge; however, general observations for the region indicate that beaver and raccoon numbers have increased in recent years. These two species are of concern because of their potential to significantly impact habitat and other wildlife species. Raccoons have the potential to impact populations of nesting birds and they also carry infectious diseases, such as distemper and rabies. Flooding caused by beaver dams and the blockage of culverts and water control structures by beavers are common. Staff time and funds are frequently expended to correct these problems.

Strategies:

- Monitor trends of terrestrial and semi-aquatic furbearers by conducting annual scent-station surveys.
- Trap and shoot nuisance animals opportunistically and remove beaver dams when necessary to protect refuge and adjacent private property and habitats.
- Consider opening the refuge to fur trapping if feasible and desirable by selected individuals or to the general public under special use permit to reduce the increasing cost of nuisance beaver control, reduce risk of disease outbreaks, and reduce predation on nesting birds.

Bald Knob NWR Objective 1-12: Small Game (Mammals)

Consider habitat needs of small game mammal species within management programs for trust species and provide for quality recreational activities.

Discussion: Gray and fox squirrels are common on the refuge where suitable, mast-producing forested habitat is available. Although there is some overlap in preferred habitats of these species, gray squirrels are more common in deep woods, whereas fox squirrels prefer small wood lots and the edges of larger forested tracts. Squirrels exhibit high potential recruitment rates (controlled largely by levels of available hard mast) balanced by high natural mortality rates and no significant long-term changes in their population densities within available habitat are expected. Squirrel hunting is popular during the fall and winter, and harvests are not considered to negatively affect the population. Forest management activities will maintain availability of quality habitats.

Cottontail rabbits and swamp rabbits are relatively common and are hunted in late winter. Their numbers are largely controlled by habitat availability. The rabbit population is usually higher in and around afforestation sites. Like squirrels, the reproductive potential is much higher than potential harvest and thus hunting is believed to be compensatory to other causes of mortality.

Strategies:

- Continue to allow the hunting of small game populations.
- Implement forest and open land management activities designed to benefit trust species that incidentally create and improve small game habitat.

Bald Knob NWR Objective 1-13: Bats

Maintain and enhance habitat to support a healthy, diverse, and viable bat population as an important component of the ecosystem.

Discussion: Several species of bats are thought to occur on the refuge, although no research or inventories on bats have been conducted. However, eight species of bats, including Rafinesque's big-eared bat, were collected on the nearby Rex Hancock/Black Swamp WMA during a research/monitoring project in the 1990s. Before management actions can be planned, a basic assessment of which species use the refuge needs to be conducted. Trapping/surveying for all species of bats on the refuge would be time consuming and expensive. Other alternatives, such as literature searches, would help initiate a species list. Target species or species of concern could then be focused on for more intensive monitoring, research, and management.

Strategies:

- Use published literature and other information sources to identify bat species that should occur in east-central Arkansas.
- Survey for bats in different habitats on the refuge using mist netting and assistance from universities and volunteers.
- Consider bat habitat needs such as roosting, maternal, or feeding areas while planning and implementing forest management activities for trust species.

Bald Knob NWR Objective 1-14: Reptiles and Amphibians

Maintain and enhance habitat for a diverse assemblage of reptile and amphibian species as important components of the ecosystem.

Discussion: Reptiles and amphibians are in decline across the southeast United States, due mostly to habitat loss and adverse modification of habitat. The White River watershed is a highly modified system as the result of extensive drainage, flood control, and clearing of forested lands for agriculture. These changes in habitat structure and hydrology have negatively affected the historic distribution and populations of reptiles and amphibians. Bald Knob NWR plays an important role in conserving remnant habitat, as well as in restoring habitat and ecological functions for reptiles and amphibians in a largely agricultural landscape. The floodplain forests, sloughs, and isolated wetland habitats are suitable for numerous species of reptiles and amphibians. No herpetological surveys have been conducted on refuge lands.

Amphibians are sensitive to a variety of environmental stressors and can serve as early indicators of environmental health conditions. Bald Knob NWR participated (2000-2003) in the Service's Abnormal Amphibians Study to document amphibian abnormalities in national wildlife refuge populations. These data indicated that the refuge had a consistent incidence of abnormalities in amphibians at a greater than background rate (3 percent). Such abnormalities are generally considered as indicative of the effects of chemical use on neighboring lands, although direct causal agents have not been identified.

Sampling also identified the occurrence of Chytridiomycosis infection in northern cricket frogs (*Acris crepitans*) collected from a rice field site. This infectious disease has the potential to cause significant declines in amphibian populations. It is unknown how long this fungal infection may have been present at this site and whether population declines due to Chytridiomycosis infections are likely to occur or have already occurred.

Approximately 6,000 acres of marginal agricultural land has been reforested on Bald Knob NWR since its establishment. Hydrologic restoration has been conducted on the Old Creek Bed associated with Overflow Creek, effectively re-establishing historic flow through the forested brake and eliminating the direct ditch flow, which was bypassing the natural system. These restoration actions should have significant positive impacts on reptile and amphibian populations of the refuge.

Strategies:

- Coordinate with partners (e.g., AGFC and State Wildlife Grants, universities, USGS-BRD) to conduct surveys for reptiles and amphibians.
- Maintain habitat connectivity to enhance reptile and amphibian movement between habitats, and aid in meeting their life cycle and resource needs.
- Restore and maintain hydrologic function in wetland and upland systems.
- Document the occurrence of Chytrid fungal disease on the refuge through monitoring of amphibian health and attempt to prevent this disease from spreading to new sites.
- Periodically monitor environmental health of infected sites, with particular emphasis on those species most susceptible to lethal infections (e.g., *Bufo* spp. and adult gopher frogs).
- Coordinate amphibian health surveys with USGS National Wildlife Health Center in Madison, Wisconsin, and immediately report any die-offs or disease outbreaks.

- Do not remove adult or larval amphibians from infected sites for translocation to other sites, as this could result in the spread of chytrid fungus.
- Be alert to the risk that collection of tadpoles and salamanders for use as bait in other areas can spread pathogens within and beyond the refuge.

Bald Knob NWR Objective 1-15: Fisheries, Mussels, and Aquatic Habitat Management

Maintain and enhance riverine and floodplain aquatic habitats, and monitor fish and freshwater mussel occurrence and abundance.

Discussion: Flowing rivers, creeks, and bayous such as the Little Red River, Overflow Creek, and Big Mingo Creek represent one form of permanent aquatic habitat on Bald Knob NWR. Abandoned channel scars in the form of open-water oxbow lakes or forested brakes provide most of the permanent lentic habitats. These two forms of habitats may be seasonally connected to rivers during flood events. The frequency and duration of connectivity is dependant on flood stages, the elevation of the water body, and the operation of water control structures. Many fishes use the flooded forests, sloughs, and lakes as spawning and/or nursery habitat. Fishes, as well as freshwater mussels, use the rivers, bayous, and deep lakes year-round.

The aquatic habitats within Bald Knob NWR support a large diversity of species. Sport fishes are found in the rivers and the backwater sloughs and lakes. Some species popular with anglers include white crappie (*Pomoxis annularis*), black crappie (*P. nigromaculatus*), largemouth bass (*Micropterus salmoides*), spotted bass (*M. punctulatus*), bluegill (*Lepomis macrochirus*) flathead catfish (*Pylodictis olivaris*), and blue catfish (*Ictalurus furcatus*). Many non-game and commercial fishes are also found in the various habitats of the refuge. There are limited data regarding adult and larval fishes within the refuge. However, it is likely that many species occur in refuge waters as larvae, juveniles, and adults. Between 75 and 100 species of fish in the lower Mississippi River basin complete one or more of their life stages in bottomland hardwood wetlands (Killgore and Miller 1995).

Freshwater mussels are likely found throughout the refuge in flowing waters and to a lesser degree in permanent backwater sloughs and lakes. Specific information on the abundance, species richness, and distribution of mussels within the refuge is limited. There have been no known mussel investigations within the refuge.

The vast majority of aquatic habitats on Bald Knob NWR are representative components of a naturally functioning bottomland hardwood ecosystem, where few active fisheries management options are available. A major limiting factor in the spawning success of both riverine and floodplain fishes is the frequency and duration of flooding. A major factor affecting the survival of adult fishes on the floodplain is water quality and/or quantity in lakes. Many lakes may dry up or are subject to extremely high water temperatures and low dissolved oxygen levels during droughts. These factors are beyond the control of refuge management.

Strategies:

- Continue to reforest cleared land in the floodplain to provide more complex cover and forage opportunities for larval, juvenile, and adult fishes during flood events.
- Restore connectivity between rivers and floodplain lakes and/or forests where feasible.
- Modify operation of the Service-owned water control structure on Overflow Creek to allow seasonal fish movement upstream.
- Continue to restore stream flow in Overflow Creek to historic channel where feasible.

- Replace or modify when possible the function or operation of culverts or water control structures that prevent floodplain connections and fish movement.
- Work with partners to gather baseline data on fish and mussel populations within the refuge.
- Encourage researchers to conduct fish and freshwater mussel investigations within the refuge.

Bald Knob NWR Objective 1-16: Endangered Species and Species of Concern

Continue to support protection and enhancement of endangered species through research, surveys, recovery, and habitat conservation.

Discussion: One goal of Bald Knob NWR is to provide habitat for threatened and endangered species. The refuge supports two species that are listed as threatened or endangered by the Service – Piping Plovers and Least Terns. Both of these bird species are seen with some regularity using the mudflat habitat. Henry Gray/Hurricane Lake WMA, the south end of which is adjacent to Bald Knob NWR, may provide habitat for Ivory-billed Woodpecker. Although this species has not been documented at Bald Knob NWR, there has been discussion of purchasing 5,000 acres between Bald Knob NWR and Henry Gray/Hurricane Lake WMA and reforesting the area to provide forest connectivity. Providing larger block size and connectivity in this area through acquisition and reforestation efforts should be encouraged. Additionally, Wood Storks (although not federal-listed in Arkansas, but a listed species elsewhere in the southeast) are being seen more and more frequently in Arkansas during the spring and fall. Continued provision of habitat for these species, as well as other migratory birds, during critical fall migration periods from August to October is essential. Maintenance, improvement, and evaluation of the hydrology and water control structures will ensure continued use by these species.

Two delisted raptor species that use Bald Knob NWR include Peregrine Falcons and Bald Eagles. Peregrine Falcons are considered recovered after their delisting in August 1999, but their presence should be monitored. They are not a very common species, but can be seen during spring and fall migration and occasionally overwinter at the refuge. Outside of preventing potential harassment of this species and monitoring their presence, little needs to be done in particular for Peregrine Falcons. Bald Eagles were removed from the endangered species list in 2007. This species is still protected by the Bald and Golden Eagle Protection Act. Several Bald Eagles overwinter on the refuge, and are a popular bird for viewing during the winter months. The refuge has a pair of nesting Bald Eagles that have successfully reared young since 2000. Refuge personnel regularly monitor the nest and implement appropriate buffering measures to ensure adequate protection.

Strategies:

- Continue to monitor Bald Eagle use of the refuge and when nests are found, implement appropriate protective measures to minimize disturbance of nesting pairs and nestlings, such as a buffer area around the nest where seasonal entry is prohibited.
- Whenever Least Terns, Piping Plovers, or Wood Storks are observed on the refuge, note the conditions of the habitat being used and determine if this condition can be repeated in the future while ensuring actions necessary for waterfowl and shorebirds are still accomplished.

Bald Knob NWR Objective 1-17: Wildlife Investigations, Inventorying, and Monitoring

Improve and expand investigations, inventorying, and monitoring of the refuge's fauna and prepare and implement an Inventory and Monitoring Plan.

Discussion: The Improvement Act formally establishes the necessity of monitoring the status and trends of fish, wildlife, and plants on national wildlife refuges. Service policy is to collect baseline information on key plants, fish, and wildlife to monitor, as resources permit, critical parameters and trends of selected species and species groups on and around Service units, and to base management on biologically and statistically sound data derived from such inventorying and monitoring (701 FW 2, Inventorying and Monitoring of Populations).

Monitoring, inventorying, and surveying (MIS) are very important means for scientifically managing trust wildlife populations and habitats, as well as meeting national, regional, and refuge goals. Before any MIS is started, the surveyor should seriously and honestly determine if: (1) Objectives, which are clear, specific, and measurable, are defined and can be practically met, (2) the results will actually be used to benefit the resource or make informed decisions, (3) quality and quantity of data needed to meet the objectives can be collected, (4) the MIS methodology is scientifically and statistically sound, (5) the costs of conducting the MIS are worth the results, (6) resources are available or will become available to complete the MIS, (7) the method of data analysis is pre-determined, and (8) MIS is prioritized so if resources become limited, then more critical MIS will be conducted.

Adaptive management is a system used by refuge managers to improve results by documenting management actions, measuring and documenting biological responses, and adapting (modifying) management actions to improve desired conditions/outcomes and determine if objectives have been met. Baseline inventorying and population monitoring at regular intervals provide data essential for informed decision-making by refuge managers and are fundamental for adaptive management. Inventorying and monitoring needs can often be met with the assistance of other Service programs and cooperative efforts with state resource agencies, universities, and USGS. Proper attention must be given to experimental and monitoring design, statistical procedure, and consistency in observation and data collection.

High-priority wildlife surveys include wintering waterfowl counts, waterfowl and shorebird responses to moist-soil management treatments, and forest breeding bird responses to forest treatments. Moreover, inventorying and monitoring efforts for adaptive management purposes should be expanded to include additional refuge resources that lack sufficient baseline data, such as reptiles, amphibians, bats, and mussels.

Strategies:

- Increase capability to conduct wildlife investigations, inventorying, and monitoring by recruiting a biological technician for Bald Knob NWR and an ecologist and hydrologist for the Complex.
- Collect inventorying and monitoring data that contribute to assessment and decision-making regarding refuge wildlife management and facilitate adaptive management.
- Continue to coordinate with partners, universities, USGS, and others to conduct research, monitoring, and inventorying of wildlife resources on the refuge.

- Implement inventorying, surveying, and monitoring efforts for refuge wildlife resources according to the following relative priority:
  High – wintering waterfowl use, grassland and forest breeding birds, shorebirds;
  Medium – secretive marsh birds, abnormal amphibians, wading birds, woodcock;
  Low – white-tailed deer, wild turkeys, reptiles and amphibians, bats, furbearers.
- Strive to develop data sets that are statistically robust so that analysis of monitoring results can be more useful in determining adaptive management responses.
- Maintain inventory and survey data in databases that enable efficient data storage and retrieval.
- Record survey activity and results in annual narratives or annual survey plans.
- Recruit assistance with wildlife inventorying and monitoring projects from volunteers, such as interns, retirees, and/or skilled volunteers from universities or conservation organizations (e.g., Arkansas Audubon), when time, personnel, and expertise are lacking at the refuge.
- If possible, provide suitable housing for volunteers and interns as a means to effectively recruit the best candidates.
- Coordinate with AGFC, USGS, COE, NRCS, and other organizations to design and conduct research that will provide refuge managers with information needed to improve wildlife management programs to better fulfill refuge purposes.

HABITAT MANAGEMENT

Bald Knob NWR Goal 2: Protect, restore, and manage the functions and values associated with diverse bottomland hardwood forest and open wetland systems in order to achieve refuge purposes and benefit migratory waterfowl, shorebirds, and other native wildlife.

Discussion: Bounded on the south and east by the Little Red River and characterized by Overflow Creek, which winds through its middle, Bald Knob NWR contains a mixture of cypress-tupelo brakes, oxbow lakes, bottomland hardwoods, recently reforested lands, moist-soil impoundments, and agricultural fields. This variety of habitats supports a tremendous array of plants and animals, particularly migratory birds.

Bald Knob NWR Objective 2-1: Moist-Soil Habitat Management

Maintain the current level of moist-soil management, to provide 500-650 acres of moist-soil production in conjunction with rice rotation, and provide over one million DEDs of waterfowl foraging habitat.

Discussion: The high seed production of moist-soil plants and their value as waterfowl foods have been known since at least the 1940s (Low and Bellrose 1944). However, managing seasonally flooded herbaceous wetland impoundments or moist-soil units has only become a widely accepted practice after many years of research in southeastern Missouri (Fredrickson and Taylor 1982, Fredrickson 1996). Today, more than 20,000 acres of moist-soil habitat are managed in more than 300 impoundments on state and federal lands in the LMV (B. Elliott, personal obs.). Although geese sometimes use moist-soil impoundments and eat shoots of germinating plants, rhizomes, roots, or tubers, the primary emphasis of moist-soil management is to produce seeds that will provide food for ducks. Regardless of the quantity of seed produced, moist-soil impoundments are highly recommended as a means of diversifying habitat (Fredrickson and Taylor 1982, Reinecke et al., 1989) and supplying food with nutrients not generally available in agricultural grains.

Suitable habitat can reliably be provided for shorebirds, waterfowl, and marshbirds by staggering the rotation among the existing moist-soil units. For example, a unit that is disked will provide mudflats for shorebirds during that first year, annual grasses and sedges for waterfowl during years two and three, and perennial vegetation for marsh birds during years four and five, at which time this unit could then be treated again to set back succession. This management action could be conducted only if woody vegetation does not become too large to disc or spray effectively to set back succession.

The current objective for Bald Knob NWR's 500 acres of moist-soil habitat is based upon a previously reported management capability. If this number represents permanent moist-soil acreage only, it may not be possible to meet it during most years. However, if the moist-soil acreage is considered in conjunction with rice rotation (set-aside), then the refuge is meeting that goal currently, with a combined acreage of 2,645 acres (1,995 acres of rice and 650 acres of moist-soil layout ground).

Strategies:

- Consult the manual *Moist-Soil Management Guidelines for the U.S. Fish and Wildlife Service, Southeast Region* (Strader and Stinson 2005) for guidance in management and evaluation of the refuge's moist-soil management program.
- Irrigate moist-soil units as necessary throughout the growing season to promote preferred plant production and reduce competition from pest plants such as cocklebur and coffeebean.
- Increase DEDs and habitat diversity if feasible by more intensively managing crop layout areas for moist-soil habitat.
- Acquire additional staff and equipment resources to: perform bi-weekly monitoring of vegetation to determine if management actions are needed, apply treatments such as disking, spraying herbicide, fertilizing, mowing, or flooding as necessary to control nuisance plants, and produce $\geq$ 500 pounds of seeds per acre.
- Monitor moist-soil management actions to determine results and efficiencies of such treatments on seed production and percent coverage of moist-soil plants in an effort to fine tune management activities to best meet objectives (adaptive management).

Bald Knob NWR Objective 2-2: Forest Management

Manage hardwood forests to provide a natural diversity of plant and animal species found in the Lower Mississippi River Valley to fulfill the purposes of the refuge.

Discussion: Currently, Bald Knob NWR contains approximately 4,000 acres of existing forest and 6,000 acres in various stages of reforestation. The largest block of forest is the Mingo Creek Unit, 1,800 plus acres. The Mingo Creek Unit, as formerly owned, was managed for timber production, and cut heavily reducing the red oak component. However, fairly desirable lower canopy development remains for resident wildlife and migratory birds. Other smaller forest blocks found on the Farm Unit of the refuge are less developed in the lower canopy and contain a higher component of oak. Some of these blocks are subject to long-term flooding or other altered hydrologic conditions and exhibit a significant senescence. Other blocks are permanently flooded tupelo/baldcypress brakes. Reforestation efforts began in 1996 and continued through 2006. Most plantations have excellent survival and growth.

The Forest Habitat Management Plan (FHMP) was written and approved for Bald Knob NWR in 2001. Continuous Forest Habitat Inventory (CFI) was implemented in 2000 and the inventory schedule is to collect data on a 10-year cycle to track habitat changes over time. The forests are evaluated under

the FHMP through a 3-year evaluation cycle that allows active treatments and monitoring to be implemented on the same cycle. Through management prescribed in the FHMP, desirable qualities can be introduced in stands where they are lacking, or enhanced or maintained in stands where they are already present to some degree.

These qualities include:

- desirable vertical structure and levels of canopy openings,
- site appropriate species diversity,
- a sustainable proportion of desirable species in various developmental stages,
- a significant proportion of large trees with full crowns, and
- adequate availability of cavities and cavity-producing trees.

Generally, all marginal croplands that are acquired for the refuge are reforested. In recent years, much of the planting has been accomplished through carbon sequestration partners, or, in some recent acquisitions, the previous owner was enrolled in the Wetlands Reserve Program (WRP). The WRP lands often receive hydrologic enhancement in addition to tree planting. Most of the lands are planted with seedlings at 12 ft. x 12 ft. spacing, or 302 trees per acre. Much recent literature emphasizes the need for higher planting densities and larger components of soft mast species. The refuge relies on natural regeneration of soft mast or pioneer species, where available, but has incorporated these species on appropriate sites that are distant from a natural seed source.

The foremost threat to forest health at the refuge is damage from beaver impoundments. Historically beaver impoundments functioned within the forested system to provide wetland habitat needed and utilized by a variety of fauna. However, the surrounding watershed has changed and it is now mostly devoid of forests and consists of agricultural lands exhibiting altered hydrologic systems. This situation results in an abnormal volume and timing of water flowing into the refuge system. When beaver dams develop, the excess impounding of water during the period of tree growth is exacerbated by these unnatural inflows and causes tree mortality.

Wildfires are an additional concern; they can occur during the dry seasons. Most wildfires are either intentionally set, or they escape from adjacent field burning. Invasive plant species constitute an additional threat.

Strategies:

- Develop and implement Annual Habitat Work Plans (forest management prescriptions), using the FHMP evaluation/treatment cycle, to improve forest habitat and structure, promote growth of lower vegetation layers, and regenerate shade intolerant species.
- Conduct post-treatment monitoring to ensure that management objectives are met and to modify treatments to achieve desired results when necessary (adaptive management).
- Maintain the CFI system on a 10-year cycle and develop tools to analyze and track refuge habitats and site conditions over time.
- Note unique habitats such as cane, corkwood, and pondberry as encountered in CFI surveys for aid in future botanical surveys.
- Develop methods to streamline data collection and maintain practical measurements.
- Plant newly acquired cropland identified for forest restoration within two years of acquisition.

- Consider individual site geomorphology, historic and desired future conditions, degree of past site alteration, and hydrology in reforestation and afforestation sites to make decisions concerning appropriate species to be planted and methods of planting, and the timing, frequency, extent, depth, and duration of hydroperiods to be restored.
- Continue active dialog with carbon sequestration companies, USDA and other partners to establish adequate species diversity and stocking rates for reforestation and degree of restoration.
- Establish areas of self-sustaining scrub-shrub (e.g., plum, deciduous holly, sumac, and other native shrubs) within reforested blocks.
- Establish connectivity between larger forest blocks whenever feasible.
- Evaluate success of restored areas through the FHMP evaluation/treatment cycle.
- Cooperate with other refuges, AGFC, and NRCS to develop strategies to transition late-stage plantations into extant forest blocks by developing techniques to enhance vertical structure, species composition, and functions of a mature forest.
- Monitor green tree reservoirs (both extant and new forest) for impacts and long-term health to facilitate adaptive management.
- Strive to mimic natural hydrology on restored areas by removing to the extent possible existing levees or other obstructions to natural runoff, overflow, and backwater flooding without negatively impacting water control capabilities essential to other refuge programs.
- Maintain a shrub component along select, low-priority roads, ditches, and levees to discourage cowbird use and encourage use by other resident wildlife for cover and forage.
- Provide a recurring influx of scrub-shrub habitats.
- Consider geomorphology, hydrology, and soil characteristics to identify potential areas for cane restoration.
- Implement measures to promote and restore cane in existing forest such as thinning the overstory.
- Identify appropriate locations to restore sites to oak savannah, grassland, scrub-shrub, and other upland communities according to site geomorphology, historic and desired future conditions, degree of site alteration, and hydrology and implement various techniques, such as mowing or prescribed burning, to restore and maintain these communities.
- Continue wildfire suppression on the refuge by relying on local fire departments, the Arkansas Forestry Commission, and properly trained staff for suppression. Maintain firebreaks in young hardwood plantations throughout the grassy understory stage.
- Prepare and implement an updated Fire Management Plan that includes the use of prescribed burning as a habitat management tool.
- Administer the forest management program in compliance with 50 CFR 29.1.

Bald Knob NWR Objective 2-3: Cropland Habitat Management

Maintain current level of cropland management, to provide annually 750 to 1,000 acres of unharvested grain crops (e.g., rice, milo, millet, corn).

Discussion: Due to the extensive loss of natural habitats historically used by wintering waterfowl to meet their foraging needs, unharvested grain crops have become a critical component of properly managed wintering waterfowl foraging habitat since these provide a great quantity of food in a relatively small area. If these so called “hot foods” are not available, the suitability of a refuge for wintering waterfowl is decreased significantly. Similarly, for optimal suitability, refuges also must provide adequate sanctuary from disturbance. Due to funding and staffing limitations, the refuge cannot afford to force account farm the number of acres needed to provide the amount of grain

forage crops required to meet refuge objectives. Presently, grain production is accomplished through the cooperative farming program in an effort to meet the foraging habitat needs of wintering ducks and geese. If farming conditions become unprofitable for the cooperative farmer, this critically important program could be lost. Therefore, every effort should be made to improve farming productivity and efficiency where and when practical.

Rice, milo, and corn are the top choices as grain forage crops for ducks. Rice is particularly resistant to decomposition even under flooded conditions and is high in calories. Milo and corn also provide high-energy resources for waterfowl and can generally be kept above the water surface, but problems often arise from depredation prior to flooding, as well as seed degradation after flooding. It is important to manage the cooperative farming program to provide a diversity of waterfowl foods.

As previously mentioned, the primary purpose for establishing Bald Knob NWR was to provide a key area for those waterfowl species (Northern Pintail, Blue-winged Teal, Canada Geese) that need open-area habitats. The Biological Review team for Bald Knob NWR felt it was important to maintain a substantial portion of the total area in rice, milo, and moist-soil habitats to meet the primary purpose of the acquisition. A combination of rice, milo, and moist-soil foods provides the calories, proteins, and other nutrients required by these ducks for basal metabolism, molting, and migration.

As noted above, foraging habitat objectives set for Bald Knob NWR during the LMVJV step-down process and during the 1998 biological review are guides for the refuge's habitat management planning. Other factors must also be considered, such as the refuge's current and future ability to contribute additional foraging habitat. Much of the habitat management recommendations made by the 1998 review team for waterfowl have been achieved by aggressive management during the past decade.

A significant amount of refuge cropland has been converted to reforested fields in recent years. Approximately 2,850 acres at Bald Knob NWR has been taken out of grain production in the last ten years, resulting in about 4,500 acres (33 percent) being currently farmed through the cooperative farming program. Even with the conversion of significant acreage from croplands to reforestation, the refuge is still meeting its overall foraging habitat objectives, and approaching its minimum cropland DED objective of 747 acres of unharvested crops (Table 7).

The arrangement made with the cooperative farmer provides significant benefits that the refuge would otherwise not be able to provide. In addition to furnishing significant amounts of foods high in energy such as rice, milo, corn, and millet as well as moist-soil production, the farmer reworks levees, pumps water in agricultural fields, and conducts routine maintenance and replacement of all pumps and other equipment associated with the irrigation infrastructure. Approximately 2,300 acres is planted to rice on any given year, and fields are rotated with milo, soybeans, millet, corn, and moist-soil production.

The cooperator's share from the total rice acreage is 75 percent and the refuge's share is 25 percent. None of the soybean acreage is kept by the refuge. Instead, the refuge's share is swapped for milo, millet, moist-soil, and occasional corn, all of which are left in the field unharvested to provide supplemental food resources for wintering waterfowl and other native wildlife. Generally, half of the rice field acreage is prepared the summer before it is to be aerially planted and consequently left fallow for the majority of the growing season. These "set aside" fields are allowed to germinate and produce moist-soil plants the remainder of the growing season and are inundated during the fall and winter months. The following spring, rice is aerially seeded into the flooded field. This practice provides large acreages of excellent moist-soil foods such as smartweed, millet, residual rice, and various grasses which are also heavily utilized by wintering waterfowl.

Shorebird management has been a high priority at Bald Knob NWR over the last 8 to 10 years. Rice farming is preferred over moist-soil management to achieve shorebird habitat objectives. Annual conversion of fallow fields to rice production coincides with early shorebird migration. Rice stubble provides the critical substrate necessary to sustain invertebrates which are so vital to shorebirds during their late summer/early fall migration. Deep water in shorebird managed fields is supplied by the cooperative farmer until early July, at which time it is slowly drained to provide critical mudflat habitat, which lasts until mid-September. This management practice also provides much needed shallow water habitat for Northern Pintail and Blue-winged Teal during this time. Water could also be pumped on selected fields to create mudflats and shallow water habitat for waterfowl. It is imperative that the cooperative farming program continue to provide foraging and overwintering needs of waterfowl, shorebirds, and other migratory birds.

In addition to use by wintering ducks, substantial numbers of Snow and White-fronted Geese have utilized refuge crop fields in recent years. In order to at least partially meet the foraging requirements of these geese, the DED objectives should be recognized as minimal requirements.

Strategies:

- Use cooperative farming as an effective and valuable tool for meeting waterfowl and shorebird foraging habitat objectives, including preventing habitat succession in the moist-soil units to promote growth of desired annual plants.
- Continue to prepare half of the rice field acreage the summer before it is to be planted and leave fallow for the majority of the growing season to provide additional acreage of excellent moist-soil foods that are heavily utilized by wintering waterfowl.
- Ensure that the cooperative farmer supplies deep water in fields managed for shorebirds until mid-July then slowly drains these fields to provide mudflat habitat that remains into mid-September.
- Consider pumping water on selected fields if desirable to create additional acreage of mudflats and shallow water habitat for shorebirds.
- Maintain adequate records of agricultural actions, crop rotations, habitat conditions, and species' responses, and modify methods as needed to meet objectives (adaptive management).
- Administer the cooperative farming program in compliance with 50 CFR 29.1.

Bald Knob NWR Objective 2-4: Water Management

Using low-maintenance water delivery systems, restore, enhance, or maintain the hydrologic regime of the refuge where feasible to assist in improving farm, moist-soil, and other wetland management units that provide important resources for wetland-dependent species.

Discussion: Management of water levels, flows, and quantities is a major focus of the refuge's active habitat management. Water control infrastructure (e.g., levees, ditches, wells, pumps, water control structures) should be evaluated for all wetland management units to determine: (1) Physical condition, (2) size and capacity to efficiently move water in and out of units, (3) type of structure, (e.g., screw-gate, flash-board riser) and whether it is efficient and appropriate, (4) proper location, and (5) ability to manage for desired water depth, timing, and duration. Management should strive to achieve independent flood and drain capabilities for all units.

Because cooperative farmers perform some water management under the direct supervision of the refuge manager, maintenance and operation of the structures should be clearly detailed and be regularly monitored.

Many areas of Bald Knob NWR have been reforested with bottomland hardwood species, many of which are relatively intolerant of growing season flooding. Certain sites have the potential conversion to greentree reservoirs (GTR). However, experience with GTRs in the MAV documents that such sites must be carefully managed to emulate natural dynamics of flooding and draining.

Some infrastructure has the capability of allowing some relatively natural overbank flooding into reforested sites, but as with GTRs, management plans must be carefully designed to emulate natural dynamics of flooding related to elevation, geomorphic surface, soils, and bottomland hardwood community type. A careful evaluation of existing infrastructure is needed to determine constraints and opportunities for simulating such flooding regimes.

Some sites on Bald Knob NWR have physical constraints to natural water flow patterns, especially efficient drainage following flooding, whether natural, beaver, or man-caused. All potential natural flow patterns on the refuge should be identified, and where possible, obstructions to natural flow patterns should be removed, or at least be modified so that prolonged growing season flooding does not occur, especially in bottomland hardwood sites. This restoration includes removing unneeded roads, levees, ditches, and berms along with restoration of sloughs, swales, and other topographic features.

Strategies:

- Develop and implement a detailed water management plan to enable proper management of all refuge wetland habitats.
- Maintain and improve the water control infrastructure to manage the moist-soil/farm units.
- Manage moist-soil/farm units for a rotational complex of habitats, water depths, time of flooding, and desired vegetation communities consistent with climate, soil, and topographic features of the refuge.
- Develop water control infrastructure necessary to provide short duration, and annually dynamic seasonal flooding regimes in reforested areas.
- Improve drainage capabilities for all bottomland forest and reforested sites subject to overbank flooding from local drainage systems, and for sites where constraints to natural flow patterns occur from activities on-site or adjacent lands.
- Coordinate with Arkansas Ecological Services Field Office, Arkansas Department of Environmental Quality, and USGS to establish additional water monitoring at creeks, streams, and ditches that flow on or across refuge lands.
- Recruit a hydrologist based at Big Lake NWR to coordinate hydrological and water quality issues on all refuges within the Complex, and to coordinate hydrological research and monitoring, provide technical advice to adjacent landowners, provide liaison function with COE, and coordinate aquatic restoration projects.

Bald Knob NWR Objective 2-5: Habitat Inventorying and Monitoring

Improve and expand inventorying and monitoring of the refuge's flora and habitats and prepare and implement an Inventory and Monitoring Plan (IMP).

Discussion: The Improvement Act formally establishes the necessity of monitoring the status and trends of fish, wildlife, and plants on national wildlife refuges. Service policy is to collect baseline information on key plants, fish, and wildlife to monitor, as resources permit, critical parameters and trends of selected species and species groups on and around Service units, and to base management on biologically and statistically sound data derived from such inventorying and monitoring (701 FW 2, Inventory and Monitoring of Populations).

Monitoring, inventorying, and surveying (MIS) are a very important means for scientifically managing trust wildlife populations and habitat as well as meeting national, regional, and refuge goals. Before any MIS is started, the surveyor should seriously and honestly determine if: (1) Objectives, which are clear, specific, and measurable, are defined and can be practically met, (2) the results will actually be used to benefit the resource or make informed decisions, (3) quality and quantity of data needed to meet the objectives can be collected, (4) the MIS methodology is scientifically and statistically sound, (5) the costs of conducting the MIS are worth the results, (6) resources are available or will become available to complete the MIS, (7) the method of data analysis is pre-determined, and (8) MIS is prioritized so if resources become limited then more critical MIS will be conducted.

Adaptive management is a system used by refuge managers to improve results by documenting management actions, measuring and documenting biological responses, and adapting (modifying) management actions to improve desired conditions/outcomes and determine if objectives have been met. Baseline inventorying and monitoring at regular intervals provide data essential for informed decision-making by refuge managers. Appropriate inventorying and pre- and post-treatment monitoring of refuge habitats are fundamental for adaptive management. Inventorying and monitoring needs can often be met with the assistance of other Service programs and cooperative efforts with State resource agencies, universities, and USGS. Proper attention must be given to experimental and monitoring design, statistical procedure, and consistency in observation and data collection.

Management of moist-soil sites in particular requires intensive monitoring throughout establishment and manipulation periods to assure that sufficient waterfowl and shorebird foods are produced to meet habitat goals. Responses to management actions by moist-soil plants varies highly due to specific treatment conditions, and monitoring is conducted in an attempt to document treatment/response relationships and duplicate such conditions in sequential years. While water gauges in each impoundment allow detailed records on water levels, data on soil moisture, plant germination, and composition also will be required to successfully manage moist-soil areas.

Strategies:

- Increase capability to conduct habitat investigations, inventorying, and monitoring by recruiting a biological technician for Bald Knob NWR and an ecologist, hydrologist, assistant forester, and forestry technician for the Central Arkansas NWR Complex.
- Collect and assess inventorying and monitoring data that are relevant to and contribute to decision-making regarding refuge habitat management (adaptive management).
- Continue to coordinate with partners, universities, USGS, and others to conduct research, monitoring, and inventorying of habitat resources on the refuge.
- Implement inventorying and monitoring efforts for refuge habitat resources including moist-soil units, CFI, botanical surveys, vegetation responses to management activities, invasive plant infestations, hard mast production, success of afforestation and reforestation activities, cropland habitat production, and plant species composition of grassland, scrub-shrub, and early successional habitats.

- Maintain habitat inventory and survey data in databases that enable efficient data storage and retrieval.
- Strive to develop data sets that are statistically robust so that analysis of monitoring results can be more useful in determining adaptive management responses if objectives are not being accomplished.
- Record survey activity and results in annual narratives or annual habitat and survey plans.
- When time, personnel, or expertise are lacking, recruit volunteers, such as interns, retirees, and/or skilled volunteers from universities or conservation clubs (e.g., Arkansas Audubon), to assist with habitat inventory and monitoring.
- If possible provide suitable housing for volunteers and interns as a means to effectively recruit the best candidates.
- Continue to enhance refuge inventory and mapping capabilities through the use of databases such as Geographic Information Systems (GIS); use capabilities shared with other Service offices (e.g., Realty, LMVJV) whenever practical.
- Continue to develop GIS data layers depicting occurrence/abundance of plant and animal species (e.g., roost sites, vegetation cover maps) and management activities (e.g., forest management compartments, water management units).
- Coordinate with AGFC, USGS, COE, NRCS, and other organizations to design and conduct research that will provide refuge managers with information needed to improve habitat management programs to better fulfill refuge purposes.

RESOURCE PROTECTION

Bald Knob NWR Goal 3: Promote communication, cooperation, and partnerships between local, state, and federal agencies, land managers, and private citizens to minimize impacts from external habitat degradation and other threats to the functions and values of the refuge's associated wetland ecosystems and watersheds.

Discussion: In order to achieve its purposes and vision, Bald Knob NWR must address a number of issues that threaten to degrade or diminish the value of its resources. These threats include invasive plant and animal species, water quality and contaminant issues, development, and law enforcement.

Bald Knob NWR Objective 3-1: Invasive Plant and Nuisance Animal Control

Identify and control/eradicate invasive, exotic, or nuisance plants and animals. Develop a database to systematically track occurrences and treatments through the FHMP evaluation/treatment cycle.

Discussion: Invasive plant species threaten refuge flora and fauna. Problems include European or Chinese privet and Japanese honeysuckle invasions along forest edges and in reforestation sites and some harvested stands, invasions of mimosa, chinaberry, and non-native pine in restored fields, and American lotus (although native) overtaking refuge impoundments.

Although beavers are a native species, their dam building activity and resulting flooding can interfere with intended habitat management on the refuge. Historically, beaver impoundments served to provide needed wetland habitat utilized by a variety of fauna. However, the surrounding watershed has changed and is now mostly agricultural instead of forested. Increased agricultural runoff, especially continual irrigation runoff during the growing season, has compounded the problem of beaver impoundments. Considerable staff time and funds are devoted to removing impoundments and controlling beaver populations.

Currently, trapping is prohibited on the refuge, but management should have the option of implementing a nuisance animal or furbearer management trapping program if necessary in the future. Nuisance animal removal should target beaver, nutria, and muskrat that negatively impact habitat and property, as well as predators such as raccoon, skunk, opossum, coyote, or bobcat that reduce priority wildlife populations and can pose disease risks. Similarly, night hunting of some species may be biologically sound and necessary and therefore should never be regarded as unconditionally prohibited. These options and others for predator, parasite, or disease control should be incorporated into management plans as needed for biological and human safety concerns.

Strategies:

- Implement invasive species prevention and control programs in compliance with 50 CFR 29.1 and EO 13112.
- Document occurrences of invasive plants and animals in a database developed during the course of the normal FHMP evaluation cycle and supplement the database with occurrences found during the course of normal management activities.
- Eradicate small plant infestations on the spot; when large infestations are encountered, develop and implement plans for coordinated control efforts.
- Control beaver populations through shooting and trapping and removal of impoundments.
- Develop and implement a database to track beaver kills and impoundment locations and characteristics.
- Consider allowing trapping/shooting of beavers and other injurious/nuisance animals (such as nutria, muskrat, raccoon, skunks, opossums, feral hogs, and coyotes) conducted under special use permits issued to selected individuals, or by commercial trapping through quota special use permits to control exotic, invasive, or nuisance wildlife to protect refuge infrastructure, wildlife habitats, priority wildlife species, and prevent disease outbreaks.
- Document results and effects of treatment efforts and adjust accordingly (adaptive management).
- Continue to pursue grants to fund control activities.

Bald Knob NWR Objective 3-2: Water Quality

Establish and implement management actions to protect and improve water quality of all aquatic habitats on the refuge for the benefit of associated fish and wildlife resources.

Discussion: Turbidity and siltation of watercourses are the refuge's main water quality problems. Most of the overall problem is due to erosion and runoff (e.g., non-point sources) originating outside the refuge's boundaries. Illegal dumping of salt-water, toxins, chemicals, sludge, and drilling mud, resulting from oil and gas operations upstream of the refuge in the Overflow and Mingo Creek and Little Red River drainages, could become a problem in the future.

Strategies:

- Identify, assess, and treat areas prone to soil erosion prior to the development of sediment input problems, especially on recent acquisitions of prior-converted farmlands.
- Avoid increased siltation by following Best Management Practices (BMPs) for all refuge actions including farming, moist-soil management, construction, and road maintenance.

- Be alert to upstream activities causing problems in refuge waters (e.g., natural gas production) and develop a monitoring system to document potential water quality problems including sampling factors such as water and sediments, fish tissues, and rapid bio-assessment techniques.
- Where and when possible, allow natural stream flow processes and stream course changes to occur; if bank stabilization is necessary employ bioengineering techniques where feasible.
- To aid in soil stabilization within the context of the refuge's reforestation programs, plant appropriate species for hydrologic conditions of the treated site using flood-tolerant shrub and tree species such as common buttonbush (*Cephalanthus occidentalis*), black willow (*Salix nigra*), red maple (*Acer rubrum*), and baldcypress (*Taxodium distichum*) in the riparian corridor of prior-converted farmlands and other areas that are prone to erosion.
- Within the context of the refuge's reforestation and forest management plans, develop beaver population objectives for refuge lands and, as appropriate, manage beaver impoundments to contribute to refuge water quality goals and objectives.
- Document the location of all culverts and water control structures on the refuge, especially those repeatedly plugged by beavers. Where feasible and desirable, replace them with rock-lined fiords (low water crossings) to maintain vehicular access, discourage dam construction by beavers, reduce blockage of structures by debris, and facilitate suitable water movement.
- Work with Service private lands biologists, AGFC, Arkansas Natural Resources Commission (ANRC), ADEQ, and NRCS to develop incentives for local farmers and land owners that encourage the use of filter strips to limit agricultural runoff into adjacent waters.
- Recruit a Hydrologist based at Big Lake NWR to coordinate hydrological and water quality issues on all refuges within the Complex, coordinate hydrological research and monitoring, provide technical advice to adjacent landowners, provide liaison function with COE, and coordinate aquatic restoration projects.

Bald Knob NWR Objective 3-3: Contaminants

Determine if any contaminants exist on Bald Knob NWR, assess their impacts to the refuge, and mitigate these impacts.

Discussion: Level I Contaminants Surveys are done for each tract of land prior to acquisition. Level II surveys have been done for a couple of tracts that had previous petroleum products onsite or pesticide mixing activities. These or higher level contaminants surveys will be conducted for future acquisitions as the situation demands.

A study of potential chemical contaminant exposure and the biological effects of this exposure at 26 national wildlife refuges in the LMRE was conducted between 1995 and 2000 (Shea et al., 2001). Water, sediment, fish, and passive sampling devices were used to acquire toxicity data to characterize chemical exposure. The study also assessed the potential biological effects of this exposure. The primary focus of the study was on organochlorine pesticides, currently used pesticides, and mercury. Additional analyses were conducted for polychlorinated biphenyls and polycyclic aromatic hydrocarbons.

Organochlorine pesticides, such as DDT and toxaphene, were widely used for many years but were banned many years ago in the United States due to their persistence and tendency to bioaccumulate and biomagnify to levels that caused documented impacts on fish-eating birds such as Bald Eagles, Ospreys, and Brown Pelicans. Total DDT in sediment for Bald Knob NWR was less than the probable effect concentration.

At least two of the 50 current use pesticides measured – trifluralin and azinphos methyl – were detected at the refuge. Also detected were 2, 4-D, bentazon, metolachlor, and trifluralin. Concentrations of PCBs in fish, water and sediment were below known threshold levels for biological effects and water quality guidelines. Mercury was detected at the refuge in every fish, but concentrations were below thresholds for fish-eating mammals, and below levels that would cause concern over human health. No fish consumption advisories for mercury or other contaminants have been issued for water bodies on or flowing through Bald Knob NWR.

In conclusion, the contaminant study indicated that potential hazards for organochlorine pesticides, PBCs, polycyclic aromatic hydrocarbons, and mercury at Bald Knob NWR were unlikely. The potential hazard for current use pesticides was uncertain.

Strategy:

- Coordinate with personnel at the Service's Arkansas Ecological Services Field Office, ADEQ, and USGS to establish and maintain a contaminants and water quality monitoring program on the refuge, conduct surveys every five years or as necessary to assess containments that could affect the refuge's fish and wildlife, and document status and trends of the refuge's aquatic resources from the biological and physical perspectives.

Bald Knob NWR Objective 3-4: Land Acquisition

Acquire lands from willing sellers within or adjacent to the approved acquisition boundary of the refuge to enhance conservation programs, achieve legislated purposes of the refuge, and fulfill the missions of the Refuge System.

Discussion: The highest priority for land acquisition at Bald Knob NWR is the purchase of 19 inholdings. Several landowners of inholdings have even suggested the idea of trading. Potential human activities or development within these inholdings could be very detrimental to the creation and maintenance of a sanctuary area for waterfowl on surrounding refuge lands. The existing situation of allowing ingress/egress through the heart of the refuge to several inholdings already is a source of operational concern for the refuge. Realty specialists should immediately approach these private landowners and begin negotiations for appraisal and purchase. The most important tract of land is an 80-acre inholding within the waterfowl sanctuary on the south end of the refuge. The Service has the "right of first refusal" but progress has been slow on acquiring this tract.

The current acquisition boundary for the refuge encompasses 16,100 acres. Unfortunately, the acquisition boundary does not include some key areas with potential willing sellers and lands of high conservation values that would enable strategic growth of the refuge. From the landscape conservation perspective, there is a need to move the existing acquisition boundary to the north of the existing north boundary of the Mingo Creek Unit to encompass the floodplain of Mingo Creek and Cypress Slough. This minor boundary expansion of 1,610 acres would allow conservation and restoration of a significant wetland habitat corridor between Henry Grey/Hurricane Lake WMA and the Mingo Creek Unit of Bald Knob NWR on the local scale. On a regional scale, it would enhance the conserved habitat corridor from the Cache River/White River/Little Red River floodplain to the Ozark

foothills. Additionally, greater protection would be afforded to the Mingo Creek wetlands and ongoing stream restoration efforts would be facilitated on the refuge. This expansion also would increase connectivity between the refuge and the WMA and provide additional opportunities for wildlife-dependent recreation. Furthermore, this expansion would facilitate acceptance of mitigation properties resulting from mitigation required for off-refuge impacts to wetlands associated with installation of the Fayetteville Express Natural Gas Pipeline slated to be installed in 2010. The refuge has already been approached by the environmental consultant for the gas company about its willingness to receive properties for inclusion in the refuge.

On a greater strategic landscape conservation scale, the Service also should consider further expanding the refuge's acquisition boundary north from the Mingo Creek Unit to create at least a 5,000-acre block along Mingo Creek to establish a large corridor between the Farm Unit of Bald Knob NWR and the adjacent 17,000-acre Henry Grey/Hurricane Lake WMA. Lands purchased in the major acquisition boundary expansion (from willing sellers) would be restored to a predominately hardwood forest. The product of acquisition, reforestation, and restoration would be a 22,000-acre contiguous block of bottomland hardwoods that would support not only key forest-breeding bird groups, such as Prothonotary Warblers, Northern Parula, Yellow-billed Cuckoo, and Wood Thrush, but also would have potential for waterfowl use if provisions are made to simulate occasional fall/winter flooding of bottomland forests in alternate three to four year periods. This expansion would benefit other indigenous bottomland hardwood forest species, such as Wood Ducks and American Woodcock, and would increase opportunities for compatible wildlife-dependent public use, including environmental education and interpretation.

Strategies:

- Enable conservation, restoration, and management of additional wildlife and aquatic habitats on Bald Knob NWR through actively pursuing acquisition of lands from willing sellers.
- Pursue a minor boundary expansion (1,610 acres) along the Mingo Creek and Cypress Slough drainage north of the Mingo Creek Unit to create additional forest and wetland restoration opportunities for the benefit of trust species.
- Consider the feasibility and desirability of pursuing a major boundary expansion, particularly north of the Mingo Creek Unit, to form a corridor between the foothills of the Ozark Mountains to AGFC's Henry Grey/Hurricane Lake WMA covering approximately 40,000 acres.

Bald Knob NWR Objective 3-4: Cultural Resources

Develop and implement a Cultural Resources Management Plan.

Discussion: Refuge management will protect cultural resources in accordance with rederal and state historic preservation legislation and regulations. To date, no cultural resources surveys or inventories have been conducted at Bald Knob NWR.

Strategies:

- Prepare a Cultural Resources Management Plan (CRMP) for the refuge.
- As guided by the CRMP:
  - Conduct a Phase I archaeological survey of the non-flooded areas of the refuge by qualified personnel as a necessary first step in cultural resources management;

    - Conduct a Phase II investigation if archaeological resources are identified during the Phase I survey, to determine the eligibility of identified resources for listing on the National Register of Historic Places prior to any disturbance;
    - Conduct a Phase III data recovery if the resources identified in Phases I and II are determined to be eligible in order to recover data and mitigate the adverse effects of any undertaking;
    - Follow procedures detailed in the CRMP for inadvertent discoveries of human remains;
    - Ensure archaeological and cultural values are described, identified, and taken into consideration prior to implementing undertakings.
- Follow procedures outlined in the CRMP for consultation with the Service's Regional Historic Preservation Office, the State Historic Preservation Office, and potentially interested American Indian tribes.
- Develop a step-down plan for surveying lands to identify archaeological resources and for developing a preservation program.

VISITOR SERVICES

Bald Knob NWR Goal 4: Develop compatible, wildlife-dependent recreational programs that lead to enjoyable experiences, a greater understanding of fish, wildlife, and habitat conservation, and a greater appreciation for the value of Bald Knob NWR.

Discussion: Bald Knob NWR supports each of the priority public uses of national wildlife refuges as identified in the Improvement Act. These are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The primary public uses of the refuge are hunting and fishing. A large portion of the refuge is a waterfowl sanctuary that is closed to the public from November 15 to February 28. There are tremendous waterfowl and shorebird/wading bird populations on the refuge during the fall and winter months.

In addition to the efforts of the current visitor services program, the refuge will strive to promote birding and wildlife observation, provide information to visitors about contacting staff when the office is closed during regular business hours, and provide additional interpretive signage at various locations on the refuge. There is no visitor services specialist assigned to the refuge.

***Bald Knob NWR Objective 4-1*:** Visitor Services Plan and Public Use Management

Promote and manage appropriate and compatible public uses, and prepare and implement a Visitor Services Plan.

Discussion: The refuge does not have a current Visitor Services Plan. This step-down management plan will provide guidance for all of refuge management's efforts and programs on behalf of public visitation. This plan will improve the ability of staff to provide the visiting public with compatible opportunities to enjoy and appreciate fish, wildlife, plants, and other resources. As a result, the visiting public will develop an understanding and will build an appreciation of each individual's role in the environment, and in particular wildlife conservation, today and into the future.

All existing public uses occurring on the refuge have been evaluated for appropriateness. All activities have also been determined to be one of the six priority public uses, to support one of the priority public uses, or are wildlife-dependent. All visitor services activities are compatible with refuge purposes, goals, and objectives.

Strategies:

- Recruit a park ranger (Visitor Services specialist) to develop and implement a visitor services program on Bald Knob NWR.
- Develop a Visitor Services Plan (with public and partner involvement) that addresses the current and future visitor services and recreation needs of refuge visitors, and reflects current legislation, director's orders, initiatives, policy, and the vision of Bald Knob NWR, and the mission of the Refuge System and the Service.
- The plan will specify programs for each type of public use, propose new facilities, address maintenance, upkeep, replacement, and/or elimination of current facilities, and identify a prospective timeline for implementation.
- Ensure that all compatibility determinations are re-evaluated as necessary.
- Maintain prohibition on camping.
- Restrict all-terrain vehicle (ATV) access to designated travel corridors only, monitor ATV access to ensure that it does not conflict with other uses, and allow ATVs only to directly support hunting.

Bald Knob NWR Objective 4-2: Visitor Welcome and Orientation

Implement visitor welcoming and orientation recommendations of the Bald Knob NWR Visitor Services Review Report according to the staggered timeframe (now, intermediate, and long-term) as outlined in that document.

Discussion: There are three main refuge entrance signs, all of which are main access points. One is located on Coal Chute Road, one on Safley Road, and one on Lone Star Road. Kiosks are also located at these locations. These kiosks offer hunting and fishing regulations and a refuge map. Directional signs are located on major road ways leading to main access points. Regulatory signs mark the seasonal waterfowl sanctuary boundary. A hunting brochure with annual regulations is available at the kiosks, headquarters, upon request by phone as well as on the website.

Presently, Bald Knob NWR does not have visitor facilities such as public restrooms or a regularly opened visitor contact station. Public roads are maintained but not marked with traffic control or directional signs. Parking lots are adequate for level of use through most of the year, with the exception of opening days of squirrel and muzzleloader deer seasons at the Mingo Creek Unit. Some unimproved roads must be closed due to heavy rains throughout the year.

The general leaflet is available at headquarters, kiosks, and upon request. No accessible alternatives exist for visitors with visual disabilities. The refuge does not have an audio-visual program nor does it have plans to develop one since there is no facility suitable for such use. The refuge now has a 3-person staff consisting of a refuge manager, engineering equipment operator, and park ranger (law enforcement – hired December 2008). There is no Visitor Services specialist on staff. The refuge manager interacts with the public and provides customer service. The public can usually reach a refuge employee by calling the Bald Knob NWR number, or can call Cache River NWR to receive information. Staff members wear the uniform properly and can be identified by such attire.

The current refuge office at Bald Knob NWR is a single-wide trailer that is not suitable for visitor reception and any type of environmental education or interpretive activities. The trailer is not fully accessible at the entrance or the inside. The trailer is unsightly due to its condition and appearance and is uninviting to the public. Funding has been obtained through the Amercian Reinvestment and Recovery Act (ARRA) for replacement of the existing office with a suitable facility to allow for efficient

public use management and administration of a visitor services program, including opportunities for environmental education and interpretation. The proposed headquarters/visitor contact station would be 1-story, approximately 2,500 square fee in size, fully ADA-compliant, and would include an exhibit area, volunteer/receptionist area, conference room, break room, law enforcement storage, public restrooms, staff offices, and public parking. This facility would be constructed within 75 yards of the current office site in the existing office/shop complex grounds, and thus would not result in loss of wildlife habitat. The new building would incorporate energy and resource conserving features that would reduce carbon and climate impacts.

Strategies:

- Replace the existing refuge office with a 2,500-square-foot headquarters/visitor contract station, using ARRA funding (approximately $650,000) and incorporating green-building design features to provide adequate facilities to meet the expectations and needs of the visiting public, to conduct visitor services programs, to facilitate work with partners, and to enable refuge staff to administer public use programs and associated operations.

    - Place directional/road signs at road intersections within the Farm Unit, if necessary, upon development of an auto-tour route.
    - Use traffic safety and information signs where appropriate.
    - Provide universally accessible parking spots by adding signage and installing concrete pads in all established parking areas.
    - Place a directional sign to the Mingo Creek Unit on Hurricane Lake Road before the turn at the bait shop.
    - Post the office hours at the refuge headquarters.
    - Consider methods to make kiosks more inviting to the public (e.g., using a different color scheme, a banner with the refuge name, a color map of the refuge with “you are here” notations, and enhanced lighting, if feasible).
    - Ensure that refuge brochures, maps, and other visitor services products are up-to-date and readily available to the public.
    - On the refuge website, use pictures that are most relevant to the refuge and add captions for the pictures, and post a calendar of events that includes significant wildlife viewing opportunities.
    - Build a new office with sufficient space for a visitor contact area.

Bald Knob NWR Objective 4-3: Hunting

Provide and expand quality, compatible hunting opportunities as feasible and desirable.

Discussion: Biologically sound hunting is a legitimate activity on a national wildlife refuge and is one of the six priority public uses identified in the Improvement Act to be allowed, as long as it is found to be compatible with refuge purposes. Bald Knob NWR is relatively new and was opened to hunting in 1997 for small game, waterfowl, turkey, and deer. The refuge is open to small game hunting with squirrel and rabbit season largely following the state framework and bag limits. Non-toxic shot is required for shotguns and dogs are permitted for squirrel and rabbit hunting beginning December 1. Quail season also follows the state’s framework and dogs are allowed on the refuge all season. Raccoon and opossum season runs for two weeks normally during the latter part of November. Dogs are required for the night hunting of raccoon. Pleasure running and field trials with dogs are prohibited. Furbearer trapping is prohibited. Access to the refuge is by automobile, ATV, boat, bicycle, and walking. All vehicles, including ATVs and bicycles, are

restricted to designated roads, levee tops, and parking areas. Horses are prohibited. Public access to hunt areas may be closed at any time necessary to protect refuge resources or visitors.

Waterfowl hunting for both ducks and geese runs concurrent with the state seasons and bag limits. Retriever dogs are allowed for waterfowl hunting. However, many refuge-specific regulations impose further restrictions on waterfowl hunters. Hunter conflicts have been minimized by the implementation of the refuge-specific regulations. Currently, there are no major problems and most hunters are aware of all regulations and abide by those regulations.

Bald Knob NWR experiences large fluctuations in the number of duck hunters from year to year as well as within years. Availability of flooded habitat is the major factor that influences hunting pressure on the refuge. When parts of the state are extremely dry, there could be up to 150 waterfowl hunters each day for several days on Bald Knob NWR. However, when the White, Cache, and other major rivers are at flood stage, creating thousands of acres of waterfowl habitat and dispersing hunters, the number of hunters utilizing the refuge is general low, with as few as 20. As with most public hunting areas, the quality and success of a hunt are inversely proportional to the number of hunters utilizing the refuge.

The hunting area on Bald Knob NWR is over four miles wide, making ATVs a practical method to transport hunters and their gear to the various fields and woods, while reducing damage to levee tops that would result if trucks were allowed during this time of year. Currently, waterfowl hunters are allowed to enter and scout in the hunting area on ATVs in the afternoons. Additionally, small game and archery deer hunters enter this area to gain access to hunt areas. However, management concerns about waterfowl disturbance associated with these activities have prompted managers to consider modifying this practice, based on the following information.

Three seasons of waterfowl survey data (2006-07, 2007-08, 2008-09) were collected on Bald Knob NWR at least once every two weeks from noon (when hunting ends) to 4:00 p.m. from November to March. Waterfowl counts were conducted in fields within the Farm Unit. Estimated waterfowl numbers were compiled by species and impoundment. Waterfowl numbers estimated on afternoons following hunts were compared to waterfowl numbers estimated on afternoons during days in which no hunting occurred. Additionally, waterfowl numbers estimated on afternoons during a non-hunting split (the non-hunting period between open seasons during the waterfowl hunt year) were compared to numbers estimated during the afternoons of the next hunt day on which a survey was conducted (2007-08 and 2008-09 seasons only).

Although statistical analyses were not performed, bird use was higher on nearly every impoundment in the hunt area on afternoons of non-hunt days versus hunt days. Furthermore, estimated total bird use for the non-hunt split days was markedly higher than that of the following hunt days on which surveys were conducted. These results indicate that morning hunting contributes to decreased afternoon waterfowl use; however, other factors such as daily afternoon disturbance also may contribute to reduced afternoon bird use during the hunt days. Although waterfowl hunting ends at noon, hunters have until 1:00 p.m. to gather their gear and depart the area. Small game and archery deer hunters, as well as the general public, are allowed entry into the hunt area after 1:00 p.m. until dark by use of ATVs or by walking to scout for waterfowl hunting spots or otherwise to observe waterfowl and other wildlife. This activity has been allowed since 1997. General observations indicate that this activity results in additional waterfowl disturbance throughout the hunt area, as well as the areas of the waterfowl sanctuary that border the access roads to the hunt area. This frequent and repetitive disturbance contributes to increased energy expenditures and prevents waterfowl from using these areas for feeding, resting, and roosting. These combined effects decrease habitat suitability and hunt opportunity.

Refuge managers are considering implementing a trial “minimal disturbance zone,” encompassing approximately 2,200 acres, in the core waterfowl hunting area by prohibiting all public entry and use into this zone after 1:00 p.m. from November 15 through February 28 (Figure 6). Only the North Granary Road public access via Frackin and Coal Chute Roads would remain open within this core area after 1:00 p.m. Other roads and portions of the hunting area would continue to be open after 1:00 p.m. for public ingress/egress by ATVs, motor vehicles, or pedestrians to allow access for afternoon archery deer and small game hunting, waterfowl scouting, and general wildlife observation and photography. Waterfowl surveys would be designed and implemented to characterize waterfowl use and determine whether afternoon scouting activity and/or other factors contribute to decreased waterfowl use and whether this public use management practice (1:00 p.m. closure) should be modified for better results, adopted permanently, or discontinued.

Also, in consideration of reducing waterfowl disturbance and improving waterfowl hunt quality, managers are considering modifying hunt access based on the following information. Designation of a “Walk-In Only” hunt area also may increase waterfowl use in the hunt area during afternoons and mornings. “Walk-In Only” hunting areas for target species such as wild turkeys, waterfowl, and deer are becoming increasingly common on federal and state wildlife management areas across the country. Walk-in hunt areas generally have less human noise, greater dispersion of hunters, fewer disturbances to both wildlife and hunters, and increased wildlife use, and thus, increased hunter success or satisfaction. A limited-sized (approximately 1-square-mile) “Walk-In Only” waterfowl hunt area on Bald Knob NWR could reduce human disturbance, increase waterfowl numbers, and increase hunter success and satisfaction. Refuge managers are considering implementing a trial, walk-in only hunt area during the waterfowl hunt season on a portion of the Farm Unit hunt area during which bird use, hunting success, and hunter satisfaction could be monitored and analyzed to determine program effectiveness and desirability.

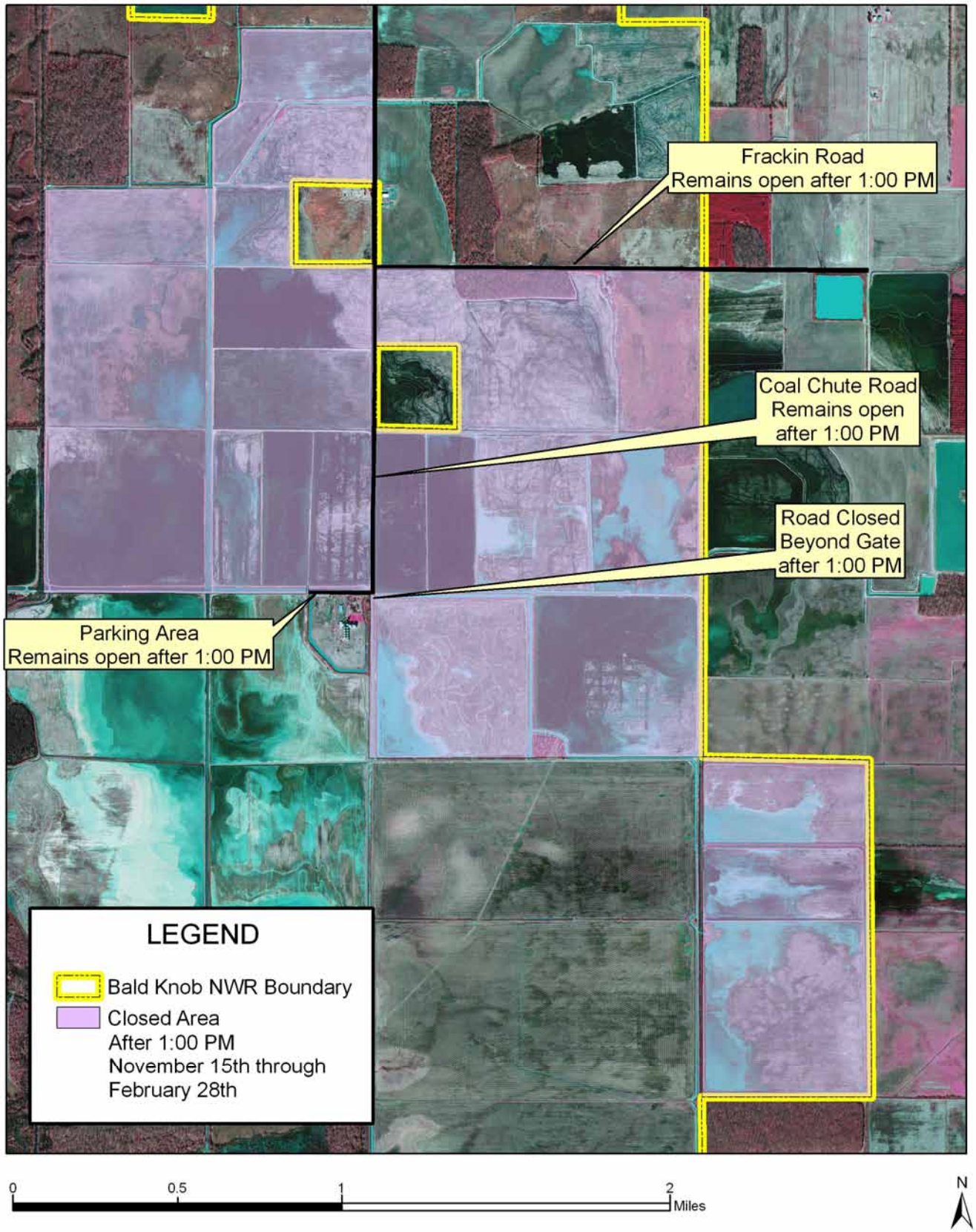
After this trial period, a decision on whether to retain the “Walk-In Only” area could be made. If permanently implemented, a “Walk-in Only” area would not reduce the size of the overall hunting area; it would just reduce ATV access to the specific walk-in hunt area. Access to the majority of the refuge’s hunting area would remain unchanged, and this modification would provide for a more diverse public hunting opportunity, while not favoring any particular group of hunters.

Opportunities for limited youth hunts, to help continue traditional outdoor hunting activities, have increased extensively over the past decade. The refuge has provided youth waterfowl hunts since 1999 and they have been received enthusiastically.

The refuge offers archery, muzzleloader, and modern gun hunting for deer. The harvest limit is one deer, either-sex, per hunt except for the archery season in which the statewide bag limit of three applies. The total number of bucks that can be harvested through a combination of all refuge hunts is two. There are no antler restrictions for buck deer. The archery season runs concurrent with the state season. Typically, the archery season opens in October and closes at the end of February. The muzzleloading deer season lasts for 9 days and usually starts during the middle of October. It coincides with the state’s first muzzleloading season.

The refuge also has a 2-day youth deer modern gun hunt the first weekend in November and a 2-day Quota Gun Deer Hunt on the Farm Unit only, which falls on the opening weekend of the state’s modern gun hunt, usually the second Saturday in November. Shotguns with rifled slugs, legal pistols, and muzzleloaders only may be possessed and used for these hunts. Hunters can harvest only one either-sex deer per hunt.

Figure 6. Proposed Minimal Disturbance Zone for Waterfowl on Bald Knob NWR



Fall archery Eastern Wild Turkey hunting is allowed only on the Mingo Creek Unit. The season runs concurrently with the archery deer season and the state bag limit applies. The season dates and bag limit runs concurrent with the state framework for Zone 4. Firearms are prohibited.

Although no specific seasons exist for these animals, hunters can take beaver, muskrat, nutria, coyote, feral hog, and armadillo during any refuge hunt by the use of the device appropriate for that hunt.

Strategies:

- Continue to conduct annual cooperative AGFC/refuge hunt regulation meetings and standardize regulations across Arkansas NWRs and State WMAs where and when feasible and desirable.
- Continue to restrict entry and disturbance in the waterfowl sanctuaries during the November 15 – February 28 closure.
- Consider implementing a "minimal disturbance zone" within the waterfowl hunt area from November 15 through February 28 by prohibiting public entry and use after 1:00 p.m. into a specified area (as depicted in Figure 6) to reduce disturbance to waterfowl and improve quality of (next day) waterfowl hunting.
- Consider implementing a walk-in hunting only hunting area in a portion of the waterfowl hunting area to reduce waterfowl disturbance and improve hunt quality.
- Allow ATV access for hunting only and restrict access to designated roads, levee tops, and parking areas. ATV access will be permitted only from September 1 to February 28.
- Mobility-impaired hunters may apply for a special use permit, allowing specialized access by ATV.
- Monitor ATV access and modify as needed to mitigate any negative impacts to refuge habitats, infrastructure, and visitors in compliance with Executive Orders 11644 and 11989
- Continue to maintain seasonal closed areas around eagle nests during the nesting season to reduce disturbance when and where necessary.
- Consider revising the refuge hunt brochure as follows:
  - Include a "quick reference chart" that lists all the hunts and dates.
  - Clarify that the refuge is closed to all other public entry and use during the Quota Gun Deer Hunt.
  - Stipulate the removal of flagging and reflective tacks at end of hunts.
- Create additional opportunities for big game hunters by expanding modern gun deer hunting if feasible and desirable
- Create additional opportunities for small game hunters by opening up dove, snipe, and woodcock hunting to statewide seasons if such action does not conflict with refuge purposes or other uses.
- Provide additional hunting areas/impoundments and improve water management throughout the refuge that would enhance hunting opportunities where feasible and desirable.
- Continue to allow Snow Goose hunting during the state conservation order hunting period.
- Consider reducing the deer muzzleloader season from 9 days to 5 days for consistency with Cache River NWR, if appropriate.
- Discontinue the spring archery turkey season on the Mingo Creek Unit.
- Continue expanding youth hunting opportunities as feasible and desirable, including allowing a limited spring youth gun turkey hunt in the Mingo Creek Unit that would correspond to the dates of the adjacent Hurricane Lake WMA youth turkey hunt.
- Utilize methods such as quotas, permits, hunt area zoning, or period limitations as warranted to maintain quality and safety of hunt activities.

- Periodically assess hunter satisfaction and quality of hunts (e.g., birds per hunter, hunter densities).
- Hire a fulltime law enforcement officer to be stationed on Bald Know NWR, to provide more adequate visitor and resource protection and enforce laws and regulations (accomplished December 2008).

Bald Knob NWR Objective 4-4: Fishing

Provide and expand quality, compatible fishing opportunities as feasible and desirable.

Discussion: Sport fishing and frogging are permitted year-round in accordance with state regulations, except for the 6,000-acre waterfowl sanctuary that is closed to all public entry and use from November 15 through February 28. Approximately 14 miles of 20- 60-foot wide irrigation canals (6 feet deep), 100 miles of smaller ditches, and several cypress-tupelo brakes and oxbow lakes provide access for bank and boat fishing. Seven boat ramps developed and maintained by the Service provide access for fishing. The Liberty Valley ramp is of significant value as it is the only public ramp for approximately 12 river miles.

Refuge waters provide habitat for fish desired by anglers, such as crappie, bream, catfish, and bass. Other species caught include drum, carp, smallmouth buffalo, and gar. Natural stocking occurs from the Little Red River through a large flood-control structure on Overflow Creek. Fish populations within the canals, ditches, and brakes are self-sustaining through natural reproduction.

The best fishing opportunities are from March-June, and at night during summer months. Water control structures throughout the levee and canal system often produce flowing water, resulting in increased catch potential. The new Concrete Dam, Mingo Creek, and Jim Wright Pond also provide good fishing opportunities. Bow fishing is allowed and occurs in very limited numbers. No special permit is required for fishing in refuge waters.

At the present time, fishing pressure is moderate, and user conflicts have not been apparent. One issue that needs to be addressed is littering by bank fishermen. Due to minimal staffing, including only one collateral duty officer, patrols and enforcement of the fishing program are limited (a full-time law enforcement officer was hired December 2008).

Strategies:

- Revise the fishing section in the annual public use, hunting, and fishing brochure to improve readability.
- Develop an accessible fishing facility at an appropriate site on the refuge, if feasible.
- Work with Service fisheries biologists to improve the refuge's fish and aquatic habitats, when and where possible.
- Modify fishing access during the critical waterfowl wintering period if necessary to reduce disturbance impacts to migratory birds.
- Monitor frog populations and consider reducing bag limit and/or season length to prevent overharvest, if warranted.

Bald Knob NWR Objective 4-5: Wildlife Observation and Photography

Provide and expand quality, compatible wildlife observation and photography opportunities as feasible and desirable.

Discussion: Access to the refuge for wildlife observation and photography is typically allowed during daylight hours year-round on more than 80 miles of gravel roads and levees within the Farm Unit. Passenger vehicles, bicycles, and walking are permitted. All vehicles, including bicycles, are restricted to designated roads, levee tops, and parking areas. An exception to open access is the 6,000-acre waterfowl sanctuary that is closed to all public entry and use from November 15 through February 28. Seven public boat ramps provide sites to launch boats into the Little Red River and various brakes for birding and wildlife observation. To protect refuge roads, gates are closed any time major flooding events occur or are anticipated. Horses/mules are prohibited year-round.

Diverse habitats create excellent opportunities for wildlife viewing and photography. Farm fields with varying crops, moist-soil impoundments, and reforested hardwood areas in various stages of growth, bottomland hardwood swamps, and cypress-tupelo brakes are all visible from the levee roads. White-tailed deer, river otters, bobcats, Eastern Wild Turkeys, numerous reptiles and amphibians, egrets, herons, and many songbirds are present year-round. During late summer and early fall, migrating shorebirds flock to the impounded areas by the tens of thousands to gather food for energy needed to complete their journeys. Fall brings as many as half a million ducks and geese: Blue, Snow, Canada, and White-fronted Geese feed in the stubble left from farming. Mallards, Northern Pintail, Blue and Green-winged Teal, and Wood Ducks feed and loaf in wetter areas during fall and winter months. Also during fall and winter, up to 60 Bald Eagles can be seen soaring across the fields and swamps. One Bald Eagle nest, visible with a spotting scope from the road, is located in a large cypress tree within the Pole Brake area. Many species of raptors including Peregrine Falcons, Red-shouldered Hawks, and Northern Harriers use refuge habitat for foraging.

Perhaps the most noticeable of wildlife during summer months are the songbirds. In the hardwood forests and swampy areas, songs of a dozen species of birds are easily heard at every stop. Indigo Buntings, White-eyed Vireos, Carolina Wrens, Tufted Titmouse, Yellow-billed Cuckoos, Acadian Flycatchers, Red-winged Blackbirds, Cardinals, Eastern Wood Peewees, and a variety of woodpeckers are among the more common.

Currently, no designated auto tour routes, observation platforms/blinds, or boardwalks exist on the refuge. A primitive 1.25-mile walking trail (one way) is located within the Squirrel Woods. Three kiosks, located at main entrances to the refuge, provide general refuge information including a list of allowed and prohibited activities. The refuge has low levels of use for wildlife observation and photography much of the year, with more moderate numbers during fall through late winter.

Issues of concern include littering, mudding (vehicular trespass off graveled roads and into farm fields, dirt roads, and levees during wet periods), vandalism of kiosks, signs, and permit boxes, tampering with water control structures, and some artifact collecting. The staff attributes these activities to the inadequate law enforcement coverage.

Strategies:

- Promote wildlife observation/photography opportunities on the Mingo Creek Unit.
- Promote shorebird observation/photography opportunities on the Farm Unit.
- Improve viewing opportunities by providing vegetative screening or photo blinds on the levees in the shorebird management area, if this does not conflict with cooperative farming or infrastructure management.
- Construct two accessible observation towers at appropriate sites, such as Granary West Road, that could double as an accessible hunting blind and another on the cross levee in the shorebird management area.

- Develop and provide a seasonal auto tour route at the Farm Unit and promote it on the refuge website.
- Develop and provide a wildlife observation/photography trail at the “Squirrel Woods” area, if feasible and desirable.

Bald Knob NWR Objective 4-6: Environmental Education and Outreach

Provide and expand quality, compatible environmental education and outreach opportunities as feasible and desirable.

Discussion: The refuge currently gives environmental education programs upon request from local schools, community groups, university classes, wildlife clubs, and garden clubs. There are several elementary, middle, and high schools in nearby communities such as Searcy, Bald Knob, and Newport, which are all within a 1-hour drive. Little Rock and Memphis are both over 1 hour away, which may be too far for schools to come. However, the refuge could be utilized by Boy and Girl Scout groups from these cities.

There are also opportunities in the immediate local communities for educational programs for Scout groups. Three universities are within the local area and there is occasional interest in the refuge on the part of instructors and students. The refuge occasionally gives programs offsite at local schools. There are currently no refuge facilities available to support environmental education. The AGFC’s Education Division has approximately 60 staff located across the state and effective partnerships help support this activity.

Outreach includes such activities as giving programs on and off the refuge, issuing news releases, providing information via the refuge website, and using personal contacts to communicate Service, Refuge System, and refuge messages. Refuge staff has not yet developed outreach plans for important individual resource issues or for addressing long-term resource issues important to the refuge, to the community, or to other audiences, such as waterfowl and migratory bird management, wetland restoration, and endangered species conservation.

The Service and Refuge System messages are incorporated into refuge programs and outreach. The key wildlife and habitat conservation messages for the refuge should include the importance of wetlands and of the refuge as habitat for wildlife. The significance of the refuge as a wintering ground for pintail and stopover habitat for shorebirds must also be emphasized.

Strategies:

- Recruit a park ranger (Visitor Services) position to plan and implement a comprehensive visitor services program for the refuge, including developing on-site and off-site environmental programs for school and civic groups.
- Develop three environmental education programs to present on request, with assistance available from the Regional Office, on such topics as waterfowl, shorebirds, moist-soil management, or reforestation.
- Recruit and train volunteers to conduct selected environmental education and outreach tasks on- and off-refuge.
- Partner with local Boy Scout troops to enable refuge staff to serve as merit badge counselors for badges such as Bird Study, Environmental Science, Fish and Wildlife Management, Fishing, Forestry, and Mammal Study.
- Promote public recognition and appreciation of Bald Knob NWR by:

- Developing and maintaining favorable media contacts;
- Joining a local Chamber of Commerce if appropriate;
- Conducting an annual media day for the Complex;
- Conducting a community open house with activities such as presentations, tree planting, tours, and a cookout in early November before the waterfowl sanctuary is closed.

Bald Knob NWR Objective 4-7: Interpretation

Provide and expand quality, compatible interpretation opportunities as feasible and desirable.

Discussion: Currently waterfowl and migratory bird management are the primary themes and messages that are interpreted on the refuge. There is no indoor space dedicated to resource interpretation for visitors. The headquarters is too small and the structure is inadequate for interpretive displays. The refuge offers a general brochure, posters, bookmarks, magnets, rulers, and stickers with general interpretive messages. The refuge also has several kiosks that offer space for hunting information and could be utilized for interpretive messages. At present, there are no portable exhibits or displays for interpreting key resources to offsite audiences.

Strategies:

- Develop and install interpretive panels at the porch area of the new office, along the seasonal wildlife drive, and at the observation towers. These panels would provide interpretation for the following topics: significance of Bald Knob NWR, the value of waterfowl sanctuary, reforestation, shorebirds, waterfowl, and moist-soil management.
- Develop and install signage at reforestation areas that provides the date when the site was reforested and at selected sites, also include an interpretive panel describing the reforestation process.
- Establish, if feasible, one or more interpretive trails that would highlight habitat management, feature unique habitats, or wildlife ecology.

REFUGE ADMINISTRATION

Bald Knob NWR Goal 5: Provide support and sufficient resources necessary to ensure that goals and objectives for habitats, fish and wildlife management, resource protection, visitor services, and refuge administration are achieved for Bald Knob NWR in particular and Central Arkansas NWR Complex overall.

Discussion: Both the Biological Review and the Visitor Services Review teams specified additional staffing, equipment, or facilities needed to implement the refuge's purposes, vision, goals, and objectives identified in this CCP. Unless adequate resources are made available, the refuge will not be able to fully implement the CCP.

Bald Knob NWR Objective 5-1: Staffing

As funding becomes available, strategically add staff that will improve the capacity and capability of Bald Knob NWR to achieve its legislated purposes and accomplish conservation and management goals and objectives.

Discussion: The Biological Review team identified an immediate need for an additional fulltime law enforcement officer (accomplished in December 2008). There is currently only one collateral-duty officer stationed at Bald Knob NWR. The need for at least one other law enforcement officer exists due to the continuous increase in consumptive public uses, especially during waterfowl hunting seasons. Numerous cases are made on and adjacent to the refuge each year, mostly related to migratory bird regulations. There has also been a dramatic increase in crimes related to the manufacture of the drug methamphetamine ("meth"), which places refuge personnel, as well as the general public users, at high risk. Several "meth" labs have been found on Bald Knob NWR and evidence of "meth" production is prevalent along refuge and surrounding county roads. A law enforcement position is also justified by the increase in non-consumptive users, such as bird watchers, photographers, and hikers. These visitors are increasing yearly and conflicts between preferred user groups and drug manufacturers are inevitable.

The team also identified an immediate need for a biological technician position to assist in shorebird, moist-soil management, beaver control, wetland restoration, and other labor-intensive programs. This position would also provide a much-needed body to mow, disk, manipulate water control structures (over 100 structures are present on the refuge at this time), and help in the shop with maintenance. Currently, the refuge manager and engineering equipment operator have proven to be outstanding at improving habitat for both resident and migratory wildlife and improving the public use programs available at the refuge. However, aches and pains are showing as the refuge continues to develop and grow. Additional maintenance personnel and resources are needed to help maintain the quality programs that were started and implemented over the past 15 years.

No visitor services staff exists on Bald Knob NWR or the Complex. A park ranger (Visitor Services specialist) must be recruited to develop and implement a visitor services plan as part of a comprehensive visitor services program for Bald Knob NWR. Additional responsibilities would include expanding the volunteer and intern programs and coordinating the establishment of a Friends Group. Environmental education and outreach programs would be implemented that would promote the refuge and help connect over 800,000 residents with nature. Development of an on-site interpretive program would involve updating and/or creating various printed materials, such as brochures and bird, reptile, and amphibian lists. The Visitor Services specialist also would coordinate planning and development of public use facilities, kiosks, information stations, nature trails, and observational towers and blinds.

Strategies:

- Upgrade current refuge manager position to appropriately reflect the true scope, complexity, and effect of the duties and responsibilities at Bald Knob NWR and within the Complex.
- Recruit a supervisory wildlife specialist to assist with administrative needs, provide daily supervision of staff, and coordinate operations and management projects on Bald Knob NWR.
- Recruit a park ranger (Visitor Services specialist) to develop and implement a comprehensive visitor services program, including environmental education.
- Recruit a biological technician to assist with surveying, monitoring, and habitat management programs.
- Recruit an engineering equipment operator to implement habitat improvement projects and maintain facilities, equipment, and infrastructure.
- Recruit a laborer to assist with maintenance of facilities and infrastructure and implementation of habitat management projects.

- Recruit a hydrologist based at Big Lake NWR to coordinate hydrological and water quality issues on all refuges within the Complex, coordinate hydrological research and monitoring, provide technical advice to adjacent landowners, serve as a liaison with COE, and coordinate aquatic restoration projects.
- Recruit a fulltime park ranger (law enforcement) to provide critically needed protection for visitors and resources (accomplished December 2008).

Bald Knob NWR Objective 5-2: Volunteers, Partners, and Friends

Expand the volunteer and intern program, establish a Friends Group for the refuge, and cooperate with partners to accomplish refuge goals and objectives.

Discussion: Around the country, volunteers and refuge support groups fortify refuge staffs with their gift of time, skills, and energy. They are integral to the success of the Refuge System. The National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act of 1998 (P.L. 105-242) strengthens the Refuge System's role in developing effective partnerships with various community groups. Whether through volunteers, refuge support groups, or other important partnerships in the community, refuge personnel will seek to make the refuge an integral part of the community, giving rise to a stronger Refuge System.

At present, Bald Knob NWR has three volunteers supervised by the refuge manager. Two of these volunteers conduct breeding bird and shorebird surveys and have expressed interest in assisting the refuge with other activities. The refuge gives the volunteers appreciation gifts and recognizes their contributions. Currently, the volunteers do not have position descriptions adequately describing their duties. The refuge does not have a Friends Group but can receive limited support from Friends of Felsenthal.

Strategies:

- Recruit a park ranger (Visitor Services specialist) to coordinate volunteer, friends, and partner programs.
- Develop a list and descriptions of projects that volunteers can assist with to facilitate accomplishment of refuge programs.
- Periodically place articles in local papers describing volunteer accomplishments and opportunities at the refuge and promoting the volunteer program.
- Recruit Boy Scout troops for assistance with specific projects that would enable them to contribute to community service activities, and offer opportunities for scouts pursuing their Eagle Scout rank to perform projects that benefit the community and nation at the refuge.
- Coordinate with universities in Arkansas and elsewhere to recruit high-quality interns to assist the refuge with operations, inventory, and management programs.
- Recruit volunteers from local universities, high schools, church groups, and civic organizations.
- Conduct a community open house on the refuge to promote volunteer opportunities and a Friends Group.
- Enlist volunteers and community leaders to assist with establishing a Friends Group for Bald Knob NWR and consult with other refuges that have successful Friends Groups to learn from their experiences in establishing such groups.
- The refuge manager and Visitor Services specialist should attend Friends Group training.

Bald Knob NWR Objective 5-3: Facilities, Infrastructure, and Equipment

Acquire and maintain all of the equipment necessary to perform habitat management, restoration, and improvement on the refuge, in addition to maintaining and improving essential infrastructure such as roads and levees.

Discussion: Currently, the refuge has an excavator, bulldozer, backhoe, road grader, and dump truck. Most equipment is presently in good shape or in the process of being replaced, except for the excavator. The refuge's excavator is old, worn out, and has a history of major repairs. In fact, it was deemed a "lemon" by the manufacturer. Nevertheless, it is the most extensively used piece of equipment on the refuge. The refuge has over 100 miles each of roads, levees, and ditches and 90 percent are subject to frequent floods each year. Roads and levees require frequent maintenance because animals often dig and undermine these areas. Beavers continually plug pipes and ditches and hinder the cooperative farming program and can pose serious consequences to forests and reforested areas. A dependable excavator is a must on this refuge. An engineering equipment operator and laborer are necessary to implement habitat management and restoration projects, maintain infrastructure and facilities, and increase productivity in achieving refuge purposes.

The current refuge office at Bald Knob NWR, located approximately 2 miles south of Bald Knob Arkansas, in White County, is a single-wide government surplus trailer that has been in use since 1997. It is substandard and grossly inadequate to meet administrative and visitor service needs. Entry points, interior workspaces, and restroom are not fully accessible. The trailer does not contain actual office spaces, the exterior and interior walls are deteriorating and failing, the roof needs to be replaced, the HVAC system is inefficient, rooms are not sufficiently lighted or ventilated, health and safety issues exist, and it is infested with rodents and insects. Furthermore, there are no suitable spaces for staff/partners meetings, visitor reception, exhibit areas for education/interpretation, or secure storage. The trailer is unsightly due to its condition and appearance. Rehabilitation or renovations are not cost effective or desirable.

Funding has been obtained through the ARRA for replacement of the existing office with a suitable facility. The proposed headquarters/visitor contact station would be 1-story, approximately 2,500 square feet in size, and will include four staff offices, conference room, break room, unisex staff restroom, law enforcement storage, utility/storage closets, fax/photocopy/file room, mudroom, separate male/female public restrooms, an exhibit area, and volunteer/receptionist area. This facility would be fully ADA-compliant, will provide adequate administrative function, and would enable suitable opportunities for visitor reception and interpretation. The building design would incorporate green-building design features, including energy-conserving lighting, HVAC, insulation, water-conserving systems, and options for alternate energy. These features would reduce carbon footprint compared to traditional buildings and would lessen environmental impacts. It also would provide a safe and comfortable environment for staff and visitors. The current office would be removed and the new headquarters/visitor contact station would be sited within close proximity to the current building within the existing office/maintenance shop grounds, which are already disturbed; therefore, new construction would necessitate minimal site disturbance and no wildlife habitat would be destroyed. The funding amount (approximately $650,000), which would include planning/design, engineering, construction, furniture, and interpretive exhibits.

The current maintenance shop/equipment storage facility at Bald Knob NWR is inadequately sized and lacks the critical components to support maximum capacity and capability. The existing structure consists of a 40x40-foot shop building with an attached 60x40-foot 3-bay open pole shed. This facility does not provide enclosed workspace for heavy equipment repair and maintenance, contains no equipment lift, and is energy-inefficient. The exterior attached pole shed is not large enough to accommodate the

refuge's heavy equipment fleet, thus causing millions of dollars of equipment to sit exposed to the elements. Due to these inadequacies, the shop building should be expanded by enclosing one of the existing pole shed bays, pouring a concrete floor, installing 2 overhead bay doors (to allow drive-through bay), adding energy efficient lighting, insulation, and HVAC systems, and installing a hydraulic vehicle lift and adequate shelving and work table space. The pole shed expansion would include adding three, 20-foot open bays, installing a metal roof, gutter system, gravel floor, and expanding the shop yard and security fence enclosing the compound. This project would enable the refuge to conserve energy, create a safer workplace, and facilitate implementation of habitat management projects on this 15,000-acre refuge that provides the best pintail duck and shorebird habitats in Arkansas. The project would be funded through the Deferred Maintenance Program.

Strategies:

- Replace the refuge office with a 2,500-square-foot headquarters/visitor contact station, to be constructed on the existing office/shop grounds, using ARRA funding (approximately $650,000), and incorporating green-building design features to provide adequate facilities to meet the expectations and needs of the existing public, to conduct visitor services programs, to facilitate work with partners, and to enable refuge staff to administer programs and operations.
- Replace the old excavator with a new excavator.
- Keep all machinery, equipment, infrastructure, and facilities in good working order by regular upkeep and maintenance.
- Acquire improved and additional equipment that enables the refuge to better accomplish habitat and public use management needs.
- Recruit an engineering equipment operator to increase the refuge's capability and capacity to perform maintenance, habitat restoration, and other projects.
- Recruit a laborer to assist with the refuge's maintenance and repair operations.
- Expand the maintenance shop to allow proper storage of refuge equipment and provide safe and adequate enclosed work areas in which to maintain and repair equipment.
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BIG LAKE NATIONAL WILDLIFE REFUGE

NOTE: All goals, objectives, and strategies described below for Big Lake NWR are set in the time context of the 15-year planning cycle of this CCP.

FISH AND WILDLIFE POPULATION MANAGEMENT

Big Lake NWR Goal 1: Manage and protect migratory birds and native wildlife populations on Big Lake NWR to fulfill the purposes for which it was established and to contribute to the mission of the National Wildlife Refuge System.

Discussion: Big Lake NWR was established to provide habitat and protection for migrating and wintering birds and is recognized as an important link in the Mississippi migration corridor. Over the years, the objectives of the refuge have expanded to include protection for endangered species, such as the Bald Eagle (now de-listed), as well as management of other game and non-game wildlife.

Big Lake NWR Objective 1-1: Migratory Waterfowl

Provide habitats on Big Lake NWR sufficient to meet the habitat and population goals of the NAWMP as stepped-down through the LMVJV.

Discussion: Big Lake NWR is almost surrounded by intensively farmed lands, but it is also the unfortunate recipient of silt-laden waters, draining many hundreds of thousands of agricultural acres in nearby Missouri. Most of the refuge's eastern boundary borders AGFC's Big Lake WMA (an 11,000+ acre bottomland forest), where duck hunting is a premier public use. Big Lake NWR's 2,500+ acre reservoir and fringe-flooded forests are key regional waterfowl wintering areas, often hosting peaks of 250,000 ducks or more. In addition, well over 5,000 geese, including White-fronted, Snow, and Canada Geese, may frequent the lake and a nearby 40-acre green-browse plot or the 200-acre moist-soil site.

Concern over waterfowl population declines in the 1980s resulted in establishment of the NAWMP, which focused the attention of federal, state, and private conservation groups on critical wintering and breeding areas. The LMVJV, which encompasses all four refuges in the Complex, was selected as one of the wintering habitat focus areas. One of the first tasks faced by the LMVJV was to develop a model or decision tool for determining how much habitat was needed, and a method for relating this objective to the population goals of the NAWMP. The solution was to consider wintering areas as responsible for contributing to the spring breeding population goals of NAWMP proportional to the percentage of ducks historically counted in wintering areas (Loesch et al. 1994, Reinecke and Loesch 1996). In order to contribute ducks to spring breeding populations, wintering areas must provide sufficient habitat to ensure adequate winter survival. To quantify winter habitat requirements, the LMVJV had to identify limiting factors and made an assumption that foraging habitat was the most likely factor to limit waterfowl populations in the LMV (Reinecke et al., 1989). The process of relating habitat objectives for individual management areas to overall habitat objectives for the LMV involved several steps (Biological Review for Bald Knob and Cache River NWRs, USFWS 2008). Step-down objectives were established for Big Lake NWR (Table 9). Duck-energy day (DED) objectives were calculated by multiplying the acreage objective by the assumed DED standard developed by the LMVJV for that habitat type.

The naturally occurring forage of Big Lake NWR, the lack of human disturbance factors on the lake, and the adjacent flooded refuge forests are keys to the success of this refuge in meeting its primary purpose for waterfowl. However, the refuge has limited opportunity for providing "hot foods" (agricultural crops) or natural foods in managed moist-soil units. More intensive moist-soil management is recommended. Also needed are agreements with the COE and the States of Missouri and Arkansas for modified water management schemes to reduce silt and contaminant deposition in the lake.

Strategies:

- Ensure sufficient sanctuary for wintering waterfowl and other water birds by maintaining appropriate quantity and quality of non-disturbance areas throughout the refuge.
- Maintain a majority of the 2,500-acre lake as a sanctuary for waterfowl during key use periods (early November through early March).
- Utilize best management practices, including drawdowns, vegetation control, water quality sampling, lake bottom consolidation, and other measures to enhance forage availability and overall habitat quality for dabbling and diving ducks in the lake and associated waters, and the 200-acre moist-soil unit.

Table 9. Big Lake NWR - Current migrating and wintering waterfowl foraging habitat objectives established by the LMVJV

Habitat	Objective[1] Acres (DED)[3]	Current Capability[2] Acres (DED)[4]	(+ or -) Acres (DED)
Moist-soil	400 (747,200)	200 (373,600)	-200 (-373,600)
Bottomland Forest	0 (0)	0 (0)	0 (0)
Unharvested Crop	0 (0)	0 (0)	0 (0)
Harvested Crop	0 (0)	0 (0)	0 (0)
Open Aquatic	0 (0)	5,386 (*)	0*
Total	**400(747,200)**	**200 (373,600)**	**- 200 (- 373,600)**

[1]Acreage and DED objective provided by the LMVJV office.
[2]Current acreage and DED capability (has levees and water control structure, some have pumping capability) provided by refuge staff.
[3]DED estimates, calculated by using standard DED figures provided by LMVJV.
[4]Updated DED estimates adopted by the LMVJV Waterfowl Working Group in June 2006: moist-soil, 1,868 DEDs/ac; bottomland hardwood, 191 DEDs/ac; unharvested crop, 14,061 DEDs/ac (estimate based on actual acres of various grain crops left unharvested and flooded during the winter period); harvested crop, 287 DEDs/ac (estimate based on actual acres of various harvested grain crops flooded during the winter period).

- Assess the need, feasibility, and options for lake water manipulation and consider potential benefits and drawbacks of such actions.
- Monitor trends in lake vegetation communities and siltation levels over time, to determine the need, timing, and type of water management actions warranted to maintain quality waterfowl habitat.
- Use information gained from monitoring to adjust management actions accordingly to better achieve waterfowl management objectives (adaptive management).
- Inform and educate local officials and the public on the status of the lake and why management actions may be required in order to fulfill refuge purposes relative to waterfowl habitat management.

Big Lake NWR Objective 1-2: Wood Ducks

Improve Wood Duck nest/brood habitats and help meet Service banding quotas to aid in monitoring of flyway populations.

Discussion: With a total area of about 7,400 acres, Big Lake NWR's forests comprise almost 70 percent of the refuge. Bald cypress swamps (5,250 acres) and bottomland hardwoods (2,159 acres) are the two main forest types present. Bottomland hardwoods include several species of oak, including Nuttall oak, overcup oak, and willow oak, and are particularly valuable habitats for nesting and foraging Wood Ducks. The Wood Duck is one of only three duck species (the others being the Mallard and the Hooded Merganser) that nests on the refuge.

Strategies:

- Use the Service's 2003 Region 4 brochure "Increasing Wood Duck Productivity" to guide refuge management activities.
- Meet refuge preseason (July – September) banding quotas (see 2003 Regional Wood Duck Guidelines).
- Maintain quantity and quality of beaver ponds, emergent wetlands, and greentree reservoirs as feasible and desirable for the benefit of Wood Ducks and other wildlife.
- Monitor Wood Duck use of these habitats and adjust management as needed.
- Monitor production and maintain Wood Duck boxes to increase Wood Duck production on the refuge and implement standardized waterfowl surveys/banding operations.

Big Lake NWR Objective 1-3: Shorebirds

Explore whether managing the timing of lake drawdowns for the control of undesirable encroaching aquatic and upland plant species can also be used to benefit shorebirds.

Discussion: The 2,500-acre lake and fringe marsh provide foraging habitat for numerous wetland avian species, such as shorebirds during occasional partial drawdowns to expose mudflats. Control of cutgrass through periodic lake drawdowns and burning are additional activities that merit consideration. Fourteen species of shorebirds are recorded at Big Lake NWR, the majority of which are spring and fall migrants. Only three species – Killdeer, Spotted Sandpiper, and American Woodcock – are found at Big Lake NWR in the summer. In winter, the Common Snipe, Killdeer, and American Woodcock use the refuge.

Strategies:

- Consider whether implementation of periodic lake drawdowns and the use of prescribed fire and herbicides as vegetation control methods for invasive plant species, such as lotus and cutgrass, will provide improved habitats (e.g., temporary mudflats, shallow wading water) for shorebirds.
- Conduct shorebird counts on at least one water management unit, with emphasis on fall migration (July - October), that overlap with waterfowl counts, to provide information on shorebird species occurrence and habitat use and determine if opportunities exist to manage water levels to benefit waterfowl and shorebirds.
- Use results of these actions to adjust water management strategies as indicated (adaptive management).

Big Lake NWR Objective 1-4: Colonial Waterbirds/Wading Birds

Maintain or provide critical habitats for long-legged wading birds to contribute to objectives set forth in the North American Waterbird Conservation Plan.

Discussion: Big Lake NWR provides habitat for breeding and wintering colonial waterbirds in shallow water areas primarily on the more than 200-acre moist-soil unit, as well as along Big Lake or the major ditches. Although this group of species is not a major priority for the refuge, management for shorebirds and waterfowl similarly provides foraging habitat for wading birds. Additionally, surveys should be implemented to identify rookery sites and to record breeding bird numbers and production. Subsequently, these areas should also be protected from disturbance.

Strategies:

- In association with management for shorebirds or marshbirds, maintain or provide areas of shallow water and mudflat habitat that will double as habitat for wading birds.
- Implement surveys to identify rookery locations, and then provide protection to these areas from disturbance during the breeding and fledging period and monitor production.
- Monitor habitat use of managed habitats by waterbirds and adjust habitat management activities as needed to better achieve objectives (adaptive management).

Big Lake NWR Objective 1-5: Marshbirds

Survey moist-soil management units for species of priority concern (particularly rails) and if present, consider maintaining some water in areas of taller emergent vegetation during the summer.

Discussion: The more than 200-acre moist-soil area could very well harbor several rail species, especially if some summer water is available in areas where taller emergent vegetation is allowed to continue growing.

Strategies:

- Renovate and refurbish the moist-soil unit levees and water control structures to enable more effective and flexible water control options.
- Survey marshbird use of the moist-soil sites on a regular basis, using accepted monitoring protocols and inventorying techniques.
- Use the results of surveys to adjust moist-soil management practices as needed to benefit marshbirds while meeting the needs of waterfowl.

Big Lake NWR Objective 1-6: Forest Breeding Birds

Working with the adjacent Big Lake WMA, maintain a healthy bottomland hardwood forest block of 20,000+ acres to support priority forest bird species in the Mississippi Alluvial Valley (Bird Conservation Region 26).

Discussion: Viewed in conjunction with the adjacent 11,000-acre, state-managed Big Lake WMA, Big Lake NWR provides a bottomland forest block of sufficient size (20,000+ acres) to support area-sensitive forest birds. The forests and understory characteristics of both areas need to be sampled and evaluated to help guide forest management programs for priority non-game bird species.

The refuge has been designated an Important Bird Area of Continental Importance, and it includes other unique sites of value, such as 5,000 acres as a National Natural Landmark and the 2,144-acre Big Lake Wilderness. The plant composition of these areas, and the character of bottomland forests, will soon change if innovative management of major flood waters and sediments is not continually implemented.

Strategies:

- Utilize forest inventories to ascertain current forest composition and structure in the contiguous NWR and WMA forests.
- Based on forest inventories, manage forest habitat for the benefit of priority forest bird species, using appropriate silvicultural techniques to improve forest stand quality, with emphasis on providing sufficient canopy openings, understory and ground cover, desirable regeneration, and overall complex structure.
- Monitor bird responses to habitat treatments and adjust management actions as necessary to achieve objectives (adaptive management).

Big Lake NWR Objective 1-7: Grassland Birds

Explore techniques to feasibly improve grassland habitat on levees for key avian species.

Discussion: Few non-forested areas exist on the refuge. However, grasslands occur along the many miles of levees and these could be managed as habitats for several early successional and grassland avian species. Timing of mowing or the use of prescribed fire for maintenance of levees could be directed to benefit key species, such as the Painted Bunting.

Strategy:

- Plan and implement, if feasible and desirable, various management techniques, such as prescribed fire, mechanical control, and plantings, to modify and enhance grassland communities on levees.

Big Lake NWR Objective 1-8: Endangered Species and Species of Concern

Manage floral and faunal populations and habitats to support and sustain rare species and special plant communities occurring on the refuge.

Discussion: Almost 80 percent of the bottomland forests of the MAV region have been converted to other uses, primarily agriculture. Much of the region's remaining forests are scattered and fragmented into small blocks that often reduce the capacity of the landscape to support many species of wildlife. It is important that the remaining forests are conserved and managed to allow the continual regeneration of tree and plant communities that support native wildlife species. The refuge bottomland forests are indeed special habitats that need to be sustained and expanded.

Big Lake NWR has 5,000 forest acres designated as a National Natural Landmark. This acreage contains pure stands of bald cypress, the only virgin timber remaining in the area. Also, a portion of the refuge (2,144 acres) is designated as the Big Lake Wilderness and is managed as a unit of the National Wilderness Preservation System. Major impacts to these areas continue to be a severely altered hydrological system, which results in increased frequency and duration of flooding and silt accumulation.

The only current threatened or endangered species that has been found on Big Lake NWR is the fat pocketbook mussel located within the right-hand chute of the Little River, south of the South End Spillway.

A more in-depth botanical survey of the refuge may identify additional rare plant species. Switch cane and river cane are historical plant communities that still occur on the refuge and could be enhanced. These cane communities are used by several bird species of concern, including Swainson's Warbler, American Woodcock, Hooded Warbler, and White-eyed Vireo.

Strategies:

- Improve the quality of the refuge's bottomland hardwood forests through active management, including stand inventories, silvicultural harvests, reforestation, and protection from excessive flooding and siltation.
- Inventory bat populations and implement actions to improve or maintain favored roosting, maternal, and feeding habitats, while meeting the needs of priority forest bird species.
- Initiate baseline inventories for vegetative communities (botanical survey), mussels, reptiles and amphibians, small mammals, and water quality of major waterways on the refuge.
- Identify locations of cane communities and implement actions to open forest canopies to allow more sunlight to reach such sites for the enhancement of native cane communities.
- Investigate techniques to establish cane via plantings (if feasible, establish several cane experimental plots).
- Monitor the water spider orchid habitats and ensure proper water conditions favorable to its continued existence.
- Continue locating active Bald Eagle nests and primary foraging areas, and protect nest sites from disturbance activities during the nesting season by use of seasonal closed areas.

Big Lake NWR Objective 1-9: Resident Game Species

Maintain a mix of open lands (agriculture, grasslands, scrub-shrub, reforested sites, etc.) as feasible to complement mature forested habitats and thus sustain healthy populations of resident game species.

Discussion: Big Lake NWR is primarily forested and contains numerous forest game species, such as deer, squirrel, and raccoon. Hunting of these and other resident game species is a popular recreational pursuit. Flood frequency and silvicultural practices will often determine the population dynamics of such forest species.

Strategies:

- Consider maintaining open-type lands (early successional habitats) on all rights-of-way extending into the refuge.
- Conduct silvicultural operations (harvests) on portions of hardwood forests to improve hard mast-producing dominated stands, as feasible within the context of forest bird management.
- As appropriate, reduce basal area through group selection cuts to ensure oak regeneration, and to improve crown size/mast production.
- When reforestation is undertaken, plant a mix of species including hard and soft mast-producing trees.
- Coordinate game harvest reporting with AGFC and determine the need for more in-depth data and options for potentially obtaining such information.

- Consider using university students or interns to operate deer check stations to obtain necessary biological data from harvested deer, or using self-checking check stations.
- Continue deer spotlight surveys with the assistance of volunteers or local universities to determine trends in deer numbers.
- Coordinate with SCWDS (University of Georgia) to conduct deer herd health checks (every 4 to 7 years).

Big Lake NWR Objective 1-10: Wildlife Inventorying and Monitoring

Improve and expand inventorying and monitoring of the refuge's fauna and prepare and implement an Inventorying and Monitoring Plan (IMP).

Discussion: The Improvement Act formally establishes the necessity of monitoring the status and trends of fish, wildlife, and plants on national wildlife refuges. Service policy is to collect baseline information on key plants, fish, and wildlife to monitor, as resources permit, critical parameters and trends of selected species and species groups on and around Service units, and to base management on biologically and statistically sound data derived from such inventorying and monitoring (701 FW 2, Inventorying and Monitoring of Populations).

Monitoring, inventorying, and surveying (MIS) are very important means for scientifically managing trust wildlife populations and habitat, as well as meeting national, regional, and refuge goals. Before any MIS is started, the surveyor should seriously and honestly determine if: (1) Objectives, which are clear, specific, and measurable, are defined and can be practically met; (2) the results will actually be used to benefit the resource or make informed decisions; (3) quality and quantity of data needed to meet the objectives can be collected; (4) the MIS methodology is scientifically and statistically sound; (5) the costs of conducting the MIS are worth the results; (6) resources are available or will become available to complete the MIS; (7) the method of data analysis is pre-determined; and (8) MIS is prioritized so if resources become limited then more critical MIS will be conducted.

Adaptive management is a system used by refuge managers to improve results by documenting management actions, measuring and documenting biological responses, and adapting (modifying) management actions to improve desired conditions/outcomes and determine if objectives have been met. Baseline inventorying and population monitoring at regular intervals provide data essential for informed decision-making by refuge managers and are fundamental for adaptive management. Inventorying and monitoring needs can often be met with the assistance of other Service programs and cooperative efforts with state resource agencies, universities, and USGS. Proper attention must be given to experimental and monitoring design, statistical procedure, and consistency in observation and data collection.

Moreover, inventorying and monitoring efforts for adaptive management purposes should be expanded to include additional refuge resources that lack sufficient baseline data, such as reptiles and amphibians, bats, and mussels.

Strategies:

- Increase the biological capability of the refuge by adding a biological technician to conduct surveys, assist with monitoring and research programs, and perform other wildlife/habitat management activities.

- Prepare and implement an Inventorying and Monitoring Plan in accordance with Service guidelines to improve basic biological information on occurrence and distribution of fauna on the refuge.
- Improve waterfowl inventory and survey efforts, in cooperation with AGFC, by:
  - Standardizing aerial and ground waterfowl surveys to be performed at least monthly starting in late October/early November through late February/early March,
  - Reporting waterfowl species numbers by units within the refuge,
  - Using the same waterfowl survey routes and times of day, conduct joint aerial waterfowl/ground surveys,
  - Ensuring funds are available for contracting with AGFC to provide monthly surveys conducted in conjunction with their regular nearby surveys, and
  - Performing aerial surveys of the refuge at least once during the coordinated statewide mid-winter inventory.
- Increase knowledge of priority bird species for the MAV (BCR26) and associated management practices for their benefit by:
  - Cooperating with AGFC, other Service offices/programs (e.g., Ecological Services, Fisheries, Migratory Birds), other agencies, and universities to initiate specific inventories and monitoring of wildlife and associated habitats on the refuge, including priority bird species for BCR26, American Woodcock, reptiles and amphibians, occurrence and habitat use of bats, occurrence of mussels, fish and aquatic macroinvertebrates, and fish and macroinvertebrate tissue sampling for identification and contaminants;
  - Coordinating with the Division of Migratory Birds and other ornithological specialists to design, develop, and implement bird monitoring procedures that will provide population status and trends information and nest productivity data;
  - Determining nest productivity for highest priority bird species in various habitat types;
  - Designing and implementing more intensive nest search and monitoring protocols in each of the major habitats of the refuge;
  - Determining habitat use in relation to specific management actions on the refuge;
  - Conducting a series of point counts across major habitat types on the refuge during passerine nesting season (about May – June);
  - Conducting a series of roadside counts placed randomly, but which represent typical habitats surrounding the refuge, within a 30-mile (50 km) circle around the refuge;
  - Conducting a series of transects or block area searches during non-breeding seasons for both migrating and wintering birds;
  - Monitoring any known heron rookeries on the refuge for species composition, number of nesting birds, and nest productivity;
  - Using information derived from these actions to guide management for priority species at the refuge to contribute to eco-regional, regional, and range-wide populations.

HABITAT MANAGEMENT

Big Lake NWR Goal 2: Protect, restore, and manage the functions and values associated with diverse bottomland hardwood forests and open wetland systems in order to achieve refuge purposes, wildlife population objectives, and to benefit migratory waterfowl and other native wildlife.

Discussion: Over the eons, the Mississippi River deposited a large volume of sediments just north of what today is known as Big Lake Bottoms. With the advent of human settlement, an extensive network of ditches was developed, which drained over 2,500 square miles of Missouri farmland, resulting in large quantities of silt being transported into Big Lake. Over the years, this silt deposition caused Big Lake to become a shallow lake. For several decades, the lake was mandated to function

as a sump and its waters were described as “too thick to drink and too thin to plow.” Eventually, local interest groups and the COE reached an agreement to divert some silty waters around the lake, provide for adequate flow to maintain and improve the area’s ecosystem, and yet still have flood-control capacity.

Wetland habitats dominate Big Lake NWR’s 11,038 acres. Refuge habitats are classified as follows:
5,250 acres - Swamp
2,600 acres - Open water
2,159 acres - Forested
437 acres - Levees, dikes, and administrative areas
300 acres - Marsh
250 acres - Moist-soil units
42 acres - Cropland

Big Lake NWR Objective 2-1: Moist-Soil Habitat Management

Improve moist-soil areas for waterfowl and other migratory birds by expanding moist-soil management capabilities and increasing production of preferred moist-soil plants.

Discussion: The refuge currently manages approximately 200-250 acres of moist-soil habitats. Moist-soil units are maintained in early successional native plant communities for the production of annual seed crops to be used as forage by waterfowl and water levels are managed to provide suitable feeding conditions for waterfowl, wading birds, and shorebirds. Management actions used to maintain moist-soil units typically include timing and duration of flooding and dewatering, fire, disking, soil disturbance, mowing, and/or herbicide application.

Strategies:

- Consult and implement recommendations from the July 2005 “Moist-Soil Management Guidelines for the USFWS, Southeast Region,” available from the Regional Migratory Bird Program.
- Improve moist-soil habitats and forage yields for waterfowl and other migratory birds by:
  - Maintaining about 200 acres of quality moist-soil habitat and provide 20-40 acres of green browse on nearby upland sites.
- Obtaining, using, and/or installing necessary equipment required for more intensive management actions (e.g., tractors, special plows, mobile pumping equipment, water control gates, and water gauges).
- Monitoring and evaluating moist-soil vegetation growth during summer and fall, and change and refine manipulations as needed.
- Utilizing intensive water control/manipulations and recording associated water depth conditions throughout spring/summer drawdowns.
- Sampling plant responses within the first 30 days of drawdowns and responding to resulting conditions with further water level management as needed to encourage preferred plant communities.
- Sampling units in the fall to determine the composition of poor, fair, and good waterfowl foods.
- Conducting seed estimation surveys in late summer and/or early fall.
- Disturbing soils through disking or other action to set back succession and enhance desired plant responses every 2 to 3 years.
- Monitoring and evaluating waterfowl use at least monthly throughout the winter period.

- Recording observations and associated management practices, and adjusting actions accordingly to meet waterfowl and shorebird objectives (adaptive management).

Big Lake NWR Objective 2-2: Forest Management

Conserve, manage, enhance, and restore the values and functions of the refuge's bottomland hardwood forests to sustain the biological needs of migratory birds and other native wildlife.

Discussion: Forestland is the dominant habitat of Big Lake NWR, covering 67 percent of the 11,000-acre refuge. The forest contains 5,250 acres of bald cypress swamp and 2,159 acres of bottomland hardwoods, for a total forested area of 7,409 acres. The forest types range from pure bald cypress swamp to sweetgum-willow oak-water oak assemblages on the higher sites. The intermediate sites are comprised of Nuttall oak, overcup oak, green ash, elm, and other common bottomland hardwood species.

Big Lake NWR was incorporated into the existing Forest Habitat Management Plan for Central Arkansas NWR Complex under a 2006 revision. There has not been an extensive forest survey of Big Lake NWR and there has not been any commercial harvest since the refuge's establishment. Thus, existing forest stands are mature and undergoing stages of stem exclusion. According to past and present managers, the forestland is greatly affected by hydrology and siltation of the area. Stands containing larger, older trees consist of flood-tolerant species, and younger stands found on higher sites may have been formed from old fields.

The refuge is divided into three forest compartments for management purposes. Compartment 51 is dominated by mature bottomland hardwoods of various types. Approximately 104 acres in two old fields were planted to hardwoods in 1995 with minor replanting in 1997. Compartment 72 is dominated by bald cypress, with some ridges containing mixed bottomland hardwood types. Also in this compartment are seven fields containing about 77 acres that were reforested at various times between 1989 and 1999. The third compartment is the Big Lake Wilderness, which is dominated by bald cypress with a very limited amount of bottomland hardwoods.

The landscape surrounding the refuge is unforested farmland for several miles, except for the adjacent Big Lake WMA that is forested. Together with the Big Lake WMA, Big Lake NWR forms a 21,000-acre forest block, the only sizable forest area within 30 miles.

Overall, the current conditions of refuge forests are the result of former habitat modifications. However, most Big Lake NWR forests contain a component of desirable overstory species. With a lack of disturbance, most stands have grown to full stocking and full crown closure. Full stocking and the age of the forest stands indicate that the trees have reached a point where growth has begun to slow and a stage of stem exclusion will occur over several years. That is, weaker stems will gradually die as others become dominant. Full crown closure has resulted in minimal development of the forest's midstory and understory, with sparse regeneration and recruitment of young stems and saplings. Most stands are even-aged, that is, dominant trees are about the same age, as indicated by the presence of the intolerant trees in the overstory and the narrow range of diameters. The average diameter in measured stands ranges from 12-16 inches dbh (diameter at breast height).

The purpose of Big Lake NWR is to be a "refuge, reserve, and breeding ground for native birds," and for "use as an inviolate sanctuary, or for any other management purposes, for migratory birds." In order to pursue these purposes, the refuge must maintain a healthy, productive forest for resident and migratory birds. Recently, the LMVJV's Forest Resource Conservation Working Group has been working on the development of "Desired Forest Conditions" to benefit priority wildlife species in forested wetlands. Attaining of desired forest conditions outlined in the report *"Forest Restoration, Management, and*

Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife Habitat" will provide habitat to benefit a wide array of priority wildlife species.

The current conditions represent an altered state from that of the natural system, in that species composition and productivity have been negatively impacted due to modified hydrology and sedimentation. The forest management program at the refuge should include inventories to characterize the current habitat, including measurements that indicate impacts from the alterations, establish a sedimentation baseline, and assimilate information from previous inventories. The inventory regime should include permanent plots that can be routinely inventoried to track changes over time.

Based on forest inventories, active management may be warranted. The context of the refuge habitat within the landscape or larger forest block should be considered; the adjacent Big Lake WMA contains expansive bottomland hardwoods that are actively managed through commercial sales. Inventories on Big Lake NWR should collect data for managers to consider regarding stand replacement and stand structure. A shift to shade-tolerant species and minimal understory and midstory is not desirable for the foraging and cover needs of wildlife. Management will have to determine whether the needs for target wildlife are being met through passive management on the refuge and the areas of active management on the adjacent Big Lake WMA, or in contrast, whether active management is needed on the refuge to regenerate desirable species, increase mast production, release dominant trees and provide the benefits of older stage trees (cavities, decay, limb structure, and other niches), produce understory cover and forage, develop midstory canopy, and/or develop forest diversity in terms of species composition and structure for the targeted wildlife species.

Forest management at Big Lake NWR will have to take into account several threatened and endangered species. The Bald Eagle, although de-listed, is still protected by the Bald and Golden Eagle Protection Act. No active forest management will be conducted within 660 feet (200 meters) of an active nest. To avoid potential impacts on the endangered fat pocket mussel, BMPs will be implemented when conducting forestry operations. Although not threatened or endangered, certain rare bats, such as the Rafinesque and Southern myotis, undoubtedly use the refuge for summer brood rearing habitat. In the summer months, bats use trees with hollows or with exfoliating bark exposed to sunlight. Treatments should be designed to retain sufficient amounts of hollow trees and trees with exfoliating bark.

Strategies:

- Develop and implement an inventory of the refuge's forest to determine baseline data for stand habitats and site conditions (including siltation impacts) and establish a permanent forest habitat monitoring system.
- Place several CFI plots in each major forest management compartment.
- Determine current siltation conditions with actual measurements, establish permanent monitoring plots, and characterize future conditions if siltation levels increase.
- Utilize on-the-ground inventories to assess the need for silviculture actions such as Timber Stand Improvement (TSI), group selection harvest, individual tree selection, and one to two-acre clearcuts, with a focus on improving status and regeneration of shade-intolerant tree species and improving habitats for priority migratory species.
- Develop annual work plans focused on using silvicultural actions to improve forest stands for priority wildlife species by promoting (within most stands):
  - development of super-dominant trees,
  - development of habitat diversity to the extent possible,
  - retention of cavity trees (with small and large diameters), and

    - tree species characterized by exfoliating bark exposed to sunlight.
- Coordinate with universities and other experts to conduct a botanical survey to identify unique habitats and plants.
- Utilize GIS and satellite imagery procedures to characterize past, current, and future vegetation community trends.
- Administer the forest management program in compliance with 50 CFR 29.1.

Big Lake NWR Objective 2-3: Habitat Investigations, Inventorying, and Monitoring

Improve and expand inventorying and monitoring of the refuge's flora and habitats and prepare and implement an Inventory and Monitoring Plan (IMP).

Discussion: The Improvement Act formally establishes the necessity of monitoring the status and trends of fish, wildlife, and plants on national wildlife refuges. Service policy is to collect baseline information on key plants, fish, and wildlife to monitor, as resources permit, critical parameters and trends of selected species and species groups on and around Service units, and to base management on biologically and statistically sound data derived from such inventorying and monitoring (701 FW 2, Inventorying and Monitoring of Populations).

Monitoring, inventorying, and surveying (MIS) are a very important means for scientifically managing trust wildlife populations and habitats, as well as meeting national, regional, and refuge goals. Before any MIS is started, the surveyor should seriously and honestly determine if: (1) Objectives, which are clear, specific, and measurable, are defined and can be practically met; (2) the results will actually be used to benefit the resource or make informed decisions; (3) quality and quantity of data needed to meet the objectives can be collected; (4) the MIS methodology is scientifically and statistically sound; (5) the costs of conducting the MIS are worth the results; (6) resources are available or will become available to complete the MIS; (7) the method of data analysis is pre-determined; and (8) MIS is prioritized so if resources become limited then more critical MIS will be conducted.

Adaptive management is a system used by refuge managers to improve results by documenting management actions, measuring and documenting biological responses, and adapting (modifying) management actions to improve desired conditions/outcomes and determine if objectives have been met. Baseline inventorying and monitoring at regular intervals provide data essential for informed decision-making by refuge managers. Appropriate inventorying and pre- and post-treatment monitoring of refuge habitats are fundamental for adaptive management. Inventorying and monitoring needs can often be met with the assistance of other Service programs and cooperative efforts with State resource agencies, universities, and USGS. Proper attention must be given to experimental and monitoring design, statistical procedure, and consistency in observation and data collection.

Management of moist-soil sites in particular requires intensive monitoring throughout critical establishment and manipulation periods to determine whether vegetative growth and production of waterfowl or shorebird foods are sufficient to meet habitat goals. While water gauges in each impoundment allow detailed records on water levels, data on soil moisture, plant germination, and composition also will be required to successfully manage moist-soil areas.

Strategies:

- Prepare and implement an Inventorying and Monitoring Plan in accordance with Service guidelines.

- Utilize satellite imagery, aerial photos, and GPS/GIS mapping to illustrate and demonstrate refuge environmental and habitat changes over time.
- Coordinate with universities, COE, and USGS to measure sedimentation rates and to establish long-term monitoring techniques that document flooding events, changes in sediment deposition, and related habitat and wildlife impacts over time, including impacts to the Big Lake Wilderness Area.
- Investigate historical water regimes and system-wide hydrologic cycles of the refuge's watershed and compile and analyze all water quality data collected.
- Utilize a geomorphologist and/or other trained specialist to obtain better information on the physical attributes of the surrounding watershed and identify any management implications for the refuge.
- Obtain historic data on flooding events as correlated to gauge readings (i.e., obtain pictorial views of flood conditions at different gauge readings).
- Coordinate with COE, USGS, and state agencies to establish a long-term system for monitoring water quality parameters on the refuge and measuring concentrations of contaminants in waters, sediments, fish, and aquatic invertebrates.
- Utilize forest inventory procedures, such as Continuous Forest Inventory, to establish current forest conditions and monitor forest changes over time.
- Coordinate with universities or other appropriate sources to have a comprehensive botanical survey conducted.

RESOURCE PROTECTION

Big Lake NWR Goal 3: Promote communication, cooperation, and partnerships between local, state, and federal agencies, land managers, and private citizens to minimize impacts from extended habitat degradation and other threats to the functions and values of the refuge's associated wetland ecosystems and watersheds.

Discussion: In order to achieve its purposes and vision, Big Lake NWR must address a number of issues that threaten to degrade or diminish the value of its resources. These threats include water quality and contaminant issues, siltation, and invasive plant and animal species.

Big Lake NWR is a remnant of a formerly extensive bottomland forest system now surrounded by agricultural development. In addition to numerous drainage ditches in Arkansas, there are several thousand miles of drainage ditches in the Missouri bootheel that send farmland runoff from approximately 2,000 square miles (over one million acres) into refuge waters.

During flood periods, most refuge inflows are heavily laden with silt. Sediment has continually filled the bottomland forest and adjacent swamps until Big Lake is now very shallow, with an average depth of just 3 feet. If the current processes continue, the lake and bottomland forests will be unable to function as productive habitats supporting numerous fish and wildlife species. Furthermore, the Big Lake Wilderness is also suffering from these negative impacts and its future as a healthy cypress system is questionable.

Big Lake NWR Objective 3-1: Water Management and Sedimentation

Work with the COE to modify water management actions and guidelines related to the operation of structures and water levels in Ditch 81 by revising and reauthorizing the Memorandum of Understanding (MOU) between the Service and the COE.

Discussion: The refuge serves as a hydrologic sump for drainage from surrounding agricultural lands. The Service has cooperated with the COE to manage water flows, but siltation loads during large flood events indicate that a modified MOU is needed for improving the management of several key water control structures. A similar partnership exists with AGFC regarding management of the adjacent Big Lake WMA and such prior agreements will need to be re-evaluated to determine mutually beneficial water levels during fall periods and improved management options.

Across the watershed, improved conservation practices on private agricultural lands could significantly improve the quality and quantity of waters entering the refuge. Additional efforts aimed at promoting use of United States Department of Agriculture (USDA) conservation methods on private lands should be a priority for the Service's private land initiatives. For lands adjacent to the refuge, another priority should be partnering with NRCS to bring together each agency's outreach programs (i.e., the Service's Partners' Program and the NRCS's Conservation Security Program).

Although the water control structures in Ditch 81 reduce a large volume of the undesirable silt and water, more flexible water management operations are needed. This is due primarily to improvements made on statewide drainage lines in Missouri and Arkansas and due to a greater frequency of major flood events. Preferred activities may require tree planting, rip-rapping, land purchasing, and modifying operating guidelines for lands and waters associated with Ditch 81.

Strategies:

- Recruit a hydrologist based at Big Lake NWR (but serving all refuges in the Complex) to coordinate with COE on water management programs, sedimentation, and flood control issues, and to coordinate research, assessments, and monitoring of aquatic habitats and water systems.
- Coordinate with AGFC regarding collaborative management of Big Lake NWR and Big Lake WMA to accomplish mutually beneficial and compatible programs for water management, water quality, aquatic habitat restoration, and lake enhancement, and to ensure the integrity of the Big Lake Wilderness.
- Pursue land acquisitions from willing sellers and via a Minor Boundary Expansion between the levees near the southern water control structure on the Diversion Canal to reduce the chance of any enhanced water management operations negatively impacting several hundred acres of adjacent private agricultural areas.
- Coordinate with Arkansas and Missouri state wildlife agencies, NRCS, and COE to identify and implement solutions to water level issues and to seek potential partners for cooperative projects (e.g., new water control structures and levee modifications).
- Coordinate with NRCS to encourage and reward private landowners for conservation actions that reduce erosion and sedimentation on farmed lands in the watershed on a basin-wide approach.
- Document current habitat quality and plant composition of the Big Lake Wilderness, including studies to establish baseline conditions and evaluate impacts of siltation.

Big Lake NWR Objective 3-2: Big Lake Wilderness

Continue to appropriately protect and manage the Big Lake Wilderness.

Discussion: The Big Lake Wilderness (Wilderness) was established in January 1976. The legislated size was 2,600 acres, but it has been adjusted to 2,144 acres. There are no special legislated conditions established for the Wilderness. There is no information available about the Wilderness at

the front desk. Compatibility determinations have not been completed for activities in the Wilderness and minimum tool analysis has not been conducted for recreation-related activities. Visitation to the Wilderness is unknown because visitor numbers are not recorded specific to the Wilderness and entrance permits are not required.

The visitor can experience solitude or a primitive and unconfined type of recreation in the Wilderness; however, external factors, such as boat traffic and noise, may interrupt these experiences and affect the solitude of the Wilderness. Litter and debris from flood waters are also detracting factors. Lack of resources to monitor activities and provide safety, education, and outreach and to reduce user conflicts hinders appropriate management. The refuge manages for primitive and unconfined recreation experiences in the Wilderness, including an archery hunt. Refuge personnel are generally present in the Wilderness during the hunting season. Wilderness-specific regulations are not described in refuge brochures, in signs, or on the website.

Strategies:

- Revise all current brochures, visitor areas, and the website to depict the Wilderness boundary and provide regulations.
- Mark the Wilderness boundary at key locations, such as Seven-Mile boat access and Timm's Point boat launch, and along the canal.
- Conduct minimum tool analysis for all recreation-related activities in the Wilderness using the Minimum Resources Decision Guide.
- Update station information on wilderness.net and the refuge's website home page.
- Post Wilderness regulations at Seven-Mile access and advise visitors that the Service is not responsible for their safety while using the Wilderness, including while using it under extreme weather, hazard, or emergency conditions.
- Evaluate using a permit system to manage visitation and group size in the Wilderness, if deemed necessary.
- Conduct minimum impact outdoor ethics training for local communities.
- Provide "Leave No Trace" materials to refuge visitors utilizing the Wilderness.
- Include information about the Wilderness in presentations and media reports about the refuge.
- Contact the Regional Wilderness Coordinator and provide Wilderness stewardship training for Complex staff, law enforcement officers, maintenance workers, and State WMA partners.
- Periodically provide safety talks to personnel and volunteers to understand the provisions and approaches of the different agencies' emergency responses in the Wilderness.
- Develop exhibits about the Wilderness at Timm's Point and Seven-Mile Boat Access.
- Evaluate the feasibility of limiting air or boat traffic along the canal next to the Wilderness to reduce noise and disturbance to the Wilderness.
- The refuge manager should attend National Wilderness Training (accomplished June 2008).

Big Lake NWR Objective 3-3: Invasive Plant and Nuisance Animal Control

Identify problem locations and situations caused by non-native, invasive, and injurious animals and plants, and implement appropriate control measures to protect refuge wildlife, habitat, and infrastructure.

Discussion: Currently, cutgrass and American lotus invasions in the lake are cause for concern. Mimosa and saw tooth oaks will need to be controlled if they proliferate. No current management practices dictate that exotics will be planted on the refuge.

Problems can be encountered with beaver, nutria, muskrat, feral swine (hogs), rabies-infected furbearers (or other disease), and excessive predation on priority species. Trapping is a biologically sound management tool to help refuges meet wildlife objectives and control injurious, overabundant, or dangerous wildlife. Trapping by the public for commercial purposes can be biologically sound and economically feasible for the refuge, but is currently not allowed. Any future commercial trapping activity would be subject to appropriateness and compatibility, and regulated by special use permit.

Strategies:

- Implement invasive species prevention and control programs in compliance with 50 CFR 29.1 and EO 13112.
- Control beaver, nutria, and muskrat populations as necessary in order to protect roads, levees, structures, infrastructure, and certain forested tracts.
- Utilize mechanical, water drawdown, chemical, and prescribed fire techniques to control undesirable aquatic (e.g., cutgrass and lotus) and upland (e.g., mimosa and saw tooth oak) species that impact wildlife habitat on the refuge.
- Initiate public outreach to alert the public that swine introductions are illegal, and there are negative impacts of feral swine on wildlife and their habitats.
- Do not allow introduction of swine or encourage recreational hunting of this species.
- As feasible and desirable, utilize commercial trapping and hunting to help reduce damage to habitats and infrastructure from beaver, nutria, muskrat, and other nuisance animals, and to protect priority species from disease or over-predation.

Big Lake NWR Objective 3-4: Land Acquisition

Acquire from willing sellers priority lands within or adjacent to the acquisition boundary that would enhance the wildlife and habitat value of the refuge and promote fulfillment of the purposes of the refuge.

Discussion: Big Lake NWR has no option for further acquisition inside its current boundary. It is expected that the refuge will have an opportunity to receive property adjacent to the refuge via fee title donation from the Arkansas Department of Transportation as replacement property for existing refuge property involved in the impending expansion and realignment of Highway 18, which runs through the southern boundary of the refuge. However, because there is no approved acquisition boundary within which the refuge can acquire land, the means are not available to accept this donation. A minor boundary expansion would enable acceptance of replacement property.

Additionally, there are several potential willing sellers adjacent to or within 1 mile of the current boundary, and these lands would provide benefits to the refuge for wetland, waterfowl, and aquatic habitat restoration and management. If purchased, the narrow strip of private lands adjacent to and along the west side of Big Lake NWR's Ditch 81 would enable the refuge or COE to bolster stabilization of the ditch banks and thus allow more flexible water gate operations. Additional lands below or near the Ditch 81 southern end structure (a few hundred acres) are also worthy of acquisition to prevent potential flooding of private lands, if more flexible operation of the water control structures is implemented. The private lands along the refuge's southeastern boundary include about

160 acres of trailers and camps below Mallard Lake that could merit acquisition to help improve wildlife habitats, decrease sources of contamination, and reduce potential for boundary disputes.

Strategies:

- Strategically enlarge the refuge to better enable fulfillment of refuge purposes by purchasing priority land from willing sellers.
- Pursue a minor boundary expansion (1,104 acres) in order to acquire lands from willing sellers suitable for conservation and restoration that are adjacent to the existing refuge boundary on the west and south.
- Explore the feasibility of acquiring additional lands along Ditch 81 to allow more flexible operation of water control gates.
- Explore feasibility and desirability of purchasing lands located below Mallard Lake (the narrow strip of trailers and campsites adjacent to Big Lake NWR).

Big Lake NWR Objective 3-5: Cultural Resources

Develop and implement a Cultural Resources Management Plan (CRMP).

Discussion: Refuge management will protect refuge cultural resources in accordance with federal and state historic preservation legislation and regulations.

Strategies:

- Prepare a CRMP for the refuge.
- As guided by the CRMP:
  - Conduct a Phase I archaeological survey of the non-flooded areas of the refuge by qualified personnel as a necessary first step in cultural resources management;
  - Conduct a Phase II investigation if archaeological resources are identified during the Phase I survey, to determine the eligibility of identified resources for listing on the National Register of Historic Places prior to any disturbance;
  - Conduct a Phase III data recovery if the resources identified in Phases I and II are determined to be eligible in order to recover data and mitigate the adverse effects of any undertaking;
  - Follow procedures detailed in the CRMP for inadvertent discoveries of human remains;
  - Ensure archaeological and cultural values are described, identified, and taken into consideration prior to implementing undertakings.
- Follow procedures outlined in the CRMP for consultation with the Service's Regional Historic Preservation Office, the State Historic Preservation Office, and potentially interested American Indian tribes.
- Develop a step-down plan for surveying lands to identify archaeological resources and for developing a preservation program.

VISITOR SERVICES

Big Lake NWR Goal 4: Develop compatible, wildlife-dependent recreation programs that lead to enjoyable experiences, a greater understanding of fish, wildlife, and habitat conservation, and a greater appreciation for the value of Big Lake NWR.

Discussion: Big Lake NWR supports each of the priority public uses of national wildlife refuges as identified in the Improvement Act. These priority uses are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The primary public uses of Big Lake NWR are hunting and fishing.

Big Lake NWR Objective 4-1: Visitor Services Plan and Public Use Management

Promote and manage appropriate and compatible public uses, and prepare and implement a Visitor Services Plan.

Discussion: An up-to-date Visitor Services Plan does not exist for Big Lake NWR. All public uses occurring on the refuge have been evaluated for appropriateness and compatibility. All of these activities are one of the six priority public uses or support one of the priority public uses and are compatible with refuge purposes, goals, and objectives.

No visitor services staff exists on Big Lake or Wapanocca NWRs or the Complex. Existing staff have neither the expertise nor the time to devote to expanded public use on the refuge. A park ranger (Visitor Services specialist) must be recruited (stationed at Wapanocca NWR but also serving Big Lake NWR) to develop and implement a visitor services plan as part of a comprehensive visitor services program for Big Lake and Wapanocca NWRs. Additional responsibilities would include expanding the volunteer and intern program and coordinating the establishment of Friends Groups. Environmental education and outreach programs would be implemented that would promote the refuges and help connect more than 1,000,000 residents with nature. Development of an on-site interpretive program would involve updating and/or creating various printed materials, such as brochures and bird, reptile, and amphibian lists. The Visitor Services specialist also would coordinate planning and development of public use facilities, kiosks, information stations, nature trails, and observational towers and blinds.

Strategies:

- Recruit a park ranger (Visitor Services specialist) to be stationed at Wapanocca NWR but also to serve Big Lake NWR, to plan and implement a comprehensive visitor services program for both refuges.
- Monitor, evaluate, and modify, as necessary, all public uses to ensure compatibility and to minimize conflicts between user groups, re-evaluating compatibility determinations as necessary.
- Develop and implement a Visitor Services Plan (with public and partner involvement) that addresses the current and future recreational needs of refuge visitors and associated visitor services; reflects applicable legislation, Service and NWRS missions, directives, and policies; and supports refuge goals and objectives.
- Continue to prohibit camping, horseback riding, ATVs, and camping.

Big Lake NWR Objective 4-2: Visitor Welcome and Orientation

Implement visitor welcoming and orientation recommendations of the Big Lake NWR Visitor Services Review Report according to the staggered timeframe (now, intermediate, and long-term) as outlined in that document.

Discussion: The refuge has entrance signs that meet Service sign standards and other signs that display hours of operations, regulations, directions, and interpretive themes. In addition, a 6-panel kiosk is located at the refuge entrance near the beginning of Wildlife Drive. A second 3-panel kiosk is located next to the fishing pier and viewing platform at Bright's Landing. The kiosks are accessible to visitors with mobility impairments. Wayside exhibits are lacking on the wildlife drive and there is also a lack of information on wildlife viewing opportunities along the drive.

The refuge does not have a visitor center but does have a contact station at the headquarters office. It is open during peak week day hours, but not on weekends. Staff have not received visitor service and volunteer related training. Information is posted at the refuge entrance door so that visitors can locate staff who can answer their questions. Because of the small staff size and their work demands in the field, staff are often not available at the contact station to provide immediate assistance to visitors.

The current refuge office at Big Lake NWR is an outdated metal building that is not suitable for visitor reception and any type of environmental education or interpretive activities. The building is not fully accessible at the entrance or on the inside. The building is unsightly due to its condition and appearance and is uninviting to the public. Funding has been obtained through the American Reinvestment and Recovery Act (ARRA) for replacement of the existing office with a suitable facility to allow for efficient public use management and administration of a visitor services program, including opportunities for environmental education and interpretation. The proposed headquarters/visitor contact station would be 1-story, approximately 2,500 square feet in size, fully ADA-compliant, and would include an exhibit hall, volunteer/receptionist area, conference room, break room, law enforcement storage, public restrooms, staff offices, and public parking. This facility would be constructed within close proximity (approximately 75 yards) of the current office site and would incorporate energy and resource conserving features to reduce environmental impacts. It would not result in the loss of wildlife habitat.

The gravel surface of the Wildlife Drive is well-maintained and the roadside is mowed as needed. However, a number of improvements are needed, such as enlarged universally accessible parking areas, wayside signs, and directional signs.

The refuge's general brochure contains welcoming and orienting information, basic refuge background and resource management information, basic regulations, information regarding visitor services activities, refuge contact information, and a refuge map with visitor services facilities noted. A welcoming and orienting audio visual program has not yet been developed, but the refuge does maintain an up-to-date website on the Internet.

Strategies:

- Replace the existing refuge office, within the existing office/shop complex, with a 2,500-square-foot headquarters/visitor contact station, using ARRA funding (approximately $650,000) and incorporating green-building design features to provide adequate facilities to meet the expectations and needs of the visiting public, to conduct visitor services programs, to facilitate work with partners, and to enable refuge staff to administer public use programs and associated operations.

<u>Implement now</u>
Improve informational signage by:

- Placing additional directional signs to the refuge in Blytheville at appropriate locations;
- Placing a sign at the start of the Wildlife Drive that identifies the length of the drive and installing mile markers along the drive; and

    - Placing a sign on the office door that provides normal office hours and refers visitors to additional information available at the headquarters kiosk.
- Remove the existing administration desk (or significantly reduce size) to enlarge the display area inside the headquarters.
- Modify the artifacts displays inside the headquarters so that the right side has a panel indicating the depths from which the artifacts came and the left side has a panel identifying the time period of each layer.
- Re-roof and paint (brown) the headquarters kiosk. Consider using a dark blue or dark green metal roof as the standard for the refuge to help create an identity.
- Ensure parking areas are well-marked and parking spots are delineated, using concrete bumpers and perimeter fencing if necessary, and universally accessible parking spots are designated with signs in all parking areas.
- Ensure that refuge brochures, maps, and other visitor services products are up-to-date and readily available to the public,

<u>Implement over the intermediate future</u>

- Improve the access road and establish a parking area on the east side of Ditch 81.
- Develop a wildflower area and eliminate the parking area on the west side of Ditch 81.
- Replace the existing Headquarters kiosk with a u-shaped kiosk or move it to the outdoor exhibit area in front of the refuge office to mask front of building. (This area could be connected to a trail leading down to the bank fishing area beside the office.)
- Install a trail head kiosk at all recreational areas to provide visitors with basic information that includes the length of the trail, permitted/prohibited activities, and what to see along the trail.
- Consider installing a portable toilet at the Bright's Landing area, if feasible and desirable.
- On the next edition of the general refuge brochure, work with Service's Regional Office Visitor Services staff to make modifications regarding the map, identify the Refuge's Big Lake Wilderness, and identify the adjacent Big Lake WMA.

<u>Implement over the long-term future</u>

- Replace the current office with a new office and visitor contact station including restrooms.
- Continue to improve informational signage on the refuge by:
    - Coordinating with AHTD and FHWA for the installation of Big Lake NWR signs on Interstate 55,
    - Installing early warning signs on Highway18 before turns to recreational areas,
    - Installing turn signs before Oak Island Nature Trail and Timm's Point off of the Big Cypress Wildlife Drive,
    - Installing a bank fishing sign at the Mid-Lake water control structure,
    - Changing the sign on the closed gate past Timm's Point to "Foot travel only – closed to vehicular traffic,"
    - Installing a "Thanks for Visiting Big Lake NWR" sign on the back of the Permitted/Prohibited sign exiting the Wildlife Drive, and
    - Including a regulations sign at all public use areas.
- Close the parking area at the West Dam bank fishing area.
- Improve the access road and establish an improved parking area at the East Dam bank fishing area.
- Consider the following locations for additional welcome and orientation kiosks: Seven-mile boat launch, Bright's Landing observation area, and East Dam bank fishing area.
- Consider developing permanent restrooms at the Bright's Landing area and at the East Dam bank fishing parking lot, as feasible and desirable.

Big Lake NWR Objective 4-3: Hunting

Provide and expand quality, compatible hunting opportunities as feasible and desirable.

Discussion: Biologically sound hunting is a legitimate activity and it is one of the six priority public uses to be allowed (when compatible) as outlined in the Improvement Act. However, there are times and periods when hunting on some sites will need to be curtailed due to the lack of refuge personnel to responsibly administer the hunt, safety reasons, the need for sanctuary sites for certain wildlife, and a lack of sufficient land acres.

Big Lake NWR is not open to waterfowl hunting but serves instead as a waterfowl sanctuary. Waterfowl hunting is available adjacent to the refuge at Big Lake WMA, which is managed by AGFC.

Squirrel, rabbit, and furbearer hunting are allowed on the refuge but under a shorter season than the state regulations. Trapping of furbearers is prohibited.

As a result of a joint project between AGFC and the Service at the Big Lake WMA and Big Lake NWR, the turkey population has increased to the point where limited hunting is offered on Big Lake WMA. Turkey numbers and habitat use on the refuge should be minitored, and if it appears feasible and desirable, and compatibility can be ensured, the refuge should coordinate with AGFC to plan and implement limited youth turkey hunting on the refuge.

Archery deer hunting is permitted on the refuge from November 1 – December 31. All harvested deer must be checked at the refuge check station and recorded on the hunter's license. The refuge manager and the Complex biologist review the deer harvest to formulate decisions on season length and bag limits. Whenever high water levels force deer to higher ground, the refuge closes to hunting.

The refuge has a current and approved hunting plan that will be revised and updated after the CCP is implemented. The current hunt plan addresses special access by permit for mobility-impaired hunters. A hunt brochure is produced annually in accordance with Service Graphics Standards. Access is by walking, motor vehicle, bicycle, boat, canoe, and kayak. ATVs, personal watercraft (e.g., jet skis and hovercraft), airboats, and horses/mules prohibited. All vehicles, including bicycles, are restricted to designated roads, levee tops, and parking areas. Public access to hunt areas may be closed at any time necessary to protect refuge resources or visitors. No accessible alternatives exist for visitors with visual disabilities to obtain hunting information. Federal and state regulations are made available to hunters at headquarters and kiosks.

Big Lake NWR does not have any law enforcement officers on staff. State officers lend some enforcement help. A law enforcement officer is needed to provide coverage for Big Lake and Wapanocca NWRs.

Strategies:

- Improve the enforcement of federal and state hunt regulations on the refuge by adding a law enforcement officer to the staff, to be stationed at Big Lake NWR but also to serve Wapanocca NWR.
- Provide a statement in the hunt brochure and on the website to the effect that, "Archery season may be closed due to high water."

- Explore the possibility of establishing a water elevation gauge reading that would allow the refuge to predict when a closing due to flooding will be necessary and then use the refuge website and a recorded phone message to inform hunters of a closure before they travel to the refuge.
- Develop an interpretive panel about the history of hunting at Big Lake NWR to be displayed at the hunt check station or in the visitor contact area.
- Implement a self-check station at the Seven-Mile Boat Ramp.
- Continue to conduct annual cooperative AGFC/Refuge hunt regulation meetings and standardize regulations across Arkansas NWRs and WMAs where and when feasible and desirable.
- Continue to coordinate with AGFC biologists and Big Lake WMA managers to formulate hunting seasons that will, in many cases, follow existing regional/statewide regulations, but with additional refuge-specific limitations or restrictions as needed.
- Utilize methods such as quotas, permits, period limitations, and hunt area zoning, if needed to maintain quality and safety of hunt activities.
- Consider implementing youth hunts, in conjunction with AGFC, to provide some additional hunting opportunities, such as a youth turkey hunt coinciding with the adjacent Big Lake WMA, if compatible, feasible, and desirable.
- Provide additional sanctuary and non-disturbance areas for waterfowl, if necessary to ensure compatibility.
- Consider allowing quail and woodcock hunting with pointing or flushing dogs and increasing the length of some small game seasons, if compatibility can be ensured and no or minimal visitor conflicts would result.
- Allow mobility-impaired hunters to use ATVs on Oak Island Trail through the issuance of special use permits.

Big Lake NWR Objective 4-4: Fishing

Provide and expand quality, compatible fishing opportunities as feasible and desirable.

Discussion: Fishing is a major public use activity at Big Lake NWR. The refuge is open to bank fishing and boat fishing from March 1 through October 31, 24 hours a day. The areas on both the east and west side of the Floodway Dam south of the Highway 18 bridge are open to bank fishing all year. Access is by walking, bicycle, motor vehicle, boat, canoe, and kayak. ATVs, personal watercraft (e.g., jet skis and hovercraft), airboats, and horses/mules are prohibited. There are boat ramps and parking areas at three locations: Timm's Point, Bright's Landing and Seven-Mile. Motorized boats are not allowed within the Big Lake Wilderness, but fishing is permitted. One site on the refuge is posted as a "Closed Area" to prevent disturbance to nesting Bald Eagles. Fishing in the Sand Slough-Mud Lake area is permitted with non-motorized boats and boats equipped with electric trolling motors only from November 1 - February 28, during daylight hours to minimize disturbance to waterfowl.

No management strategies are employed to control angler numbers but this has not been a problem to date. Boat and bank access on Big Lake and its tributaries is limited, which helps to control angler numbers. Because of limited bank fishing access points, the potential for overcrowding may occur during periods of heavy seasonal use. At present, however, there are no known conflicts between users with regard to bank and boat fishing opportunities. Fishing and boating laws are enforced by state and federal officers. No fishing information has been kept on species, numbers taken, or residency of anglers. Routine compliance checks and patrols of fishing areas are conducted by state law enforcement officers. The program is evaluated annually and changes are made, as needed. The refuge is not enrolled in the Recreational Fee Program and no consideration has been given to

including the fishing program in the Recreation Fee Program. Coordination of the refuge fishing program has been routinely conducted with the AGFC.

Refuge regulations require anyone engaged in commercial fishing activities to first obtain a special use permit and pay a $25 fee. Special conditions for commercial anglers are stipulated with the special use permit.

A universally accessible route has been established at Bright's Landing parking lot and the fishing pier. Trails open to anglers are maintained and are free of hazards (especially for use in low-light or inclement weather conditions). The area around the floodway receives frequent floods and more attention is needed to remove logs and debris near the paths. No public restrooms are available to anglers.

Fishing tournaments are not permitted on refuge waters. The refuge staff is not active in state boater safety education programs. A fishing plan exists and will be updated according to the schedule in Chapter V. Other fishing opportunities are considered regularly by staff. Title 50 of CFR (Code of Federal Regulations) contains regulations for the current fishing program.

Strategies:

- Enhance the refuge's main lake habitats for the benefit of aquatic life and to improve fishing success.
- Lower lake levels or drain the lake periodically, in conjunction with waterfowl habitat management, as necessary and feasible to enable habitat improvements and lake bed rehabilitation.
- Consider holding high water in Big Lake (perhaps to late May) every 3 to 4 years to facilitate natural reproduction of fishes, if deemed necessary and feasible.
- Improve quality of fishing experience on Big Lake NWR by:
  - Abandoning the 5 ½ -Mile Bank fishing area,
  - Closing the West Dam bank fishing area and enhancing the access to the East Dam area,
  - Improving the access road and parking on the east side of Ditch 81,
  - Installing a universally accessible fishing pier near the outflow of the water control structure at Timm's Point,
  - Improving the enforcement of refuge fishing regulations by adding a law enforcement officer to cover Big Lake and Wapanocca NWRs on a regular basis, and
  - Posting state health advisories related to fish consumption when necessary.
- Avoid boating, sport fishing, commercial fishing, and other forms of active disturbance to waterfowl on Big Lake during the November to March period of high migratory bird use to ensure compatibility.
- Monitor fishing activities to ensure that waterfowl disturbance is minimal and compatibility with refuge purposes is maintained, and adjust activities as warranted.

Big Lake NWR Objective 4-5: Wildlife Observation and Photography

Provide and expand quality, compatible wildlife observation and photography opportunities as feasible and desirable.

Discussion: The refuge has a 3.1-mile wildlife auto drive (Wildlife Drive), which begins at the headquarters and extends along the shore of Big Lake. There is ample parking at the end of the drive and space for visitors to turn vehicles around to return to the headquarters. Viewing opportunities are best during winter months when water levels are high.

Big Lake NWR has two hiking trails. Oak Island Nature Trail is 1.2 miles in length each way. There is a trail sign posting the name of the trail, but no additional signs are located on the trail to provide information on trail length or interpretive topics. Bright's Trail is a 1-mile loop trail with ample directional signage, but without interpretive signage. Bicycles are prohibited on these two trails.

Bright's Landing has an observation deck overlooking part of the lake. This facility offers views of migratory waterfowl during late fall and early winter, and with year-round viewing of Wood Ducks. White-tailed deer also can be viewed from the pier during the winter months. The area is universally accessible with parking and concrete pads for visitors with disabilities. There is one kiosk for orientation and interpretation.

The Timm's Point observation area is universally accessible via the Wildlife Drive and offers viewing of the largest portion of the lake. Visitors can observe winter migrants such as eagles, osprey, and large concentrations of waterfowl from this vantage point. There are no improved structures and part of the area is currently roped off until repairs can be made to a deteriorated retaining wall.

The refuge has plans to construct a photo blind/observation tower near the moist-soil management area. The blind will be constructed to offer concealment, while also providing appropriate openings for photographing wildlife.

The refuge general brochure, updated in September 1999, provides a general map of the entire refuge, which indicates the approximate locations for the Wildlife Drive, observation areas, and trails. The map will need to be amended in the future to accurately depict the locations of the new photo blind, boat ramp, and kiosk at Seven-Mile Boat Access.

Strategies:

- Build an observation tower with spotting scope at Timm's Point.
- Build an observation tower and provide year-round access at Baker's Island Mud Slough.
- Create some openings in the vegetation along Wildlife Drive to allow views of the lake.
- Install photo blinds in strategic locations on the refuge to provide additional wildlife observation and photography opportunities, as feasible and desirable.
- Place a wayside exhibit at Cow Opening (Oak Island Trail) that highlights wildlife and habitats to be viewed and photographed.

Big Lake NWR Objective 4-6: Environmental Education and Outreach

Provide and expand quality, compatible environmental education and outreach opportunities as feasible and desirable.

Discussion: There is not an organized environmental education program at Big Lake NWR. The refuge manager provides one presentation per month to school groups or to community organizations. There are more requests for presentations than the staff has time to fulfill. The refuge staff also participates in one or two job fairs at local schools each year. Boys and Girls Scout groups come to the refuge for programs and sometimes to participate in projects such as building bird boxes

and kiosks. The refuge has great potential for expanding environmental education in the area with two school systems within 15 miles of the refuge and also a community college nearby.

The refuge enjoys considerable support in nearby communities, but refuge staff have not yet had the opportunity to develop outreach plans or goals for important individual resource issues or for addressing long-term resource issues. Issues important to the refuge, to the community, or to other audiences include waterfowl and migratory bird management, fishing, wetland and lake restoration, water level control and management, and management of the Wilderness. Hunters, anglers, and birders have the most at stake with the prevalent refuge-related issues and potential actions. The state, members of Congress, businesses, community leaders, conservation groups, stakeholders, special interest groups, and media have been included in the list of audiences for outreach.

Both Service and Refuge System messages are incorporated into the refuge's programs. They are communicated through outreach activities, such as when the refuge manager presents programs both on and off the refuge. The refuge uses news releases, personal contacts, and website to communicate outreach messages. The refuge would benefit from a portable exhibit to use in delivering these messages. Articles in local newspapers and other media and personal contacts have been the primary methods for communication to various audiences. In addition, an effort should be made to establish a Friends Group. Before expanding outreach, additional resources would be needed.

Strategies:

- Develop three standard environmental education programs to be available for presentation on request.
- Develop standard PowerPoint presentations to present to community groups about the value of the refuge to the environment.
- Partner with a local college to apply for and implement a Nature of Learning grant to develop environmental education programs for the refuge.
- Collaborate with local teachers to develop teacher-led field trips that could include environmental education activities at Bright's Landing, Wildlife Drive, and Timm's Point.
- Recruit and train volunteers to assist with developing and presenting environmental education programs.
- Foster relationships and coordinate with media to highlight the refuge in local newspapers, radio programs, and television news spots.
- Conduct an annual refuge event, such as an open house, with an environmental theme.
- Hold a congressional field day (either for Big Lake/Wapanocca NWRs or for the entire Complex) to highlight the role of the refuges in the community.
- Continue to participate in local job fairs.

Big Lake NWR Objective 4-7: Interpretation

Provide and expand quality, compatible interpretation opportunities as feasible and desirable.

Discussion: Information about the refuge is available to the public at kiosks located at the refuge office, Timm's Point, and Bright's Landing. Taxidermy mounts and artifacts are on exhibit in the visitor reception area of the office. The general brochure provides information about management of the refuge, as well as public use opportunities. Additionally, the refuge has a portable exhibit about fish.

Strategies:

- Develop and install interpretive panels at the following locations that would highlight key topics of interest on the refuge such as:
  - Headquarters kiosk (cultural history, basic welcome and orientation information),
  - Headquarters visitor contact station (archaeological - depicting the depth of soil layers and timeframes for artifacts),
  - Timm's Point (migratory birds, water management),
  - Bright's Landing fishing pier (fishes, wildlife viewing opportunities),
  - Photo blind/observation tower at moist-soil unit (moist-soil management activities, wildlife observation),
  - Seven-Mile boat landing (wilderness, history of hunting at Big Lake NWR, partnership with Big Lake WMA, cooperative management),
  - Eastside bank fishing area (water management, drainage and sedimentation issues, refuge history, fishes), and
  - Wildlife Drive (champion tree, connections between natural and cultural history).

REFUGE ADMINISTRATION

Big Lake NWR Goal 5: Provide support and sufficient resources necessary to ensure that goals and objectives for habitats, fish and wildlife management, resource protection, visitor services, and refuge administration are achieved for Big Lake NWR in particular and Central Arkansas NWR Complex overall.

Discussion: Both the Biological Review and the Visitor Services Review teams specified additional staffing, facilities, and equipment needed to implement the refuge's purposes, vision, goals, and objectives identified in this CCP. Unless adequate resources are made available, filling these positions and acquiring the necessary facilities and equipment will not be possible, and the refuge will not be able to fully implement the CCP.

Big Lake NWR Objective 5-1: Staffing

As funding becomes available, strategically add staff that will improve the capacity and capability of Big Lake NWR to achieve its legislated purposes and accomplish conservation and management goals and objectives.

Discussion: Currently, the refuge has only two full-time employees located on site – the refuge manager and an engineering equipment operator. Other Service personnel may be called upon for additional expertise and assistance. However, it is obvious that the refuge could use additional on-site employees to meet the many administrative, biological, habitat improvement, and management actions that are required on a daily basis. A law enforcement officer is critically needed to provide adequate protective services to Big Lake and Wapanocca NWRs. A biologist with forestry expertise or a biological technician would be highly beneficial. Additionally, due to the number of water-related issues on Big Lake NWR and the Complex overall, a hydrologist is needed to provide expertise and technical assistance to management. The refuge could also use a maintenance person (laborer) to assist with day-to-day operations and maintenance. Hiring additional staff will reduce the time the refuge manager currently expends on non-administrative and operational tasks.

Strategies:

- Recruit a park ranger (law enforcement) to be stationed at Big Lake NWR, but would provide resource and visitor protection and outreach for both Big Lake and Wapanocca NWRs.
- Upgrade current refuge manager position to appropriately reflect the true scope, complexity, and effect of the duties and responsibilities on Big Lake NWR and within the Complex.
- Coordinate with AGFC law enforcement personnel for their cooperation and assistance in preventing and controlling illegal activities on the refuge.
- Recruit a wildlife biologist or biological technician, preferable with forestry background, to implement habitat management projects, perform surveys and monitoring, and assist with other biological programs.
- Recruit a park ranger (Visitor Services specialist), to be stationed at Wapanocca NWR, but also would serve Big Lake NWR, to develop and implement improved and expanded visitor services programs.
- Recruit a hydrologist based at Big Lake NWR to coordinate hydrological and water quality issues on all refuges within the Complex, coordinate hydrological research and monitoring, provide technical advice to adjacent landowners, serve as a liaison with COE, and coordinate aquatic restoration projects.
- Recruit a maintenance person (laborer) to assist with day-to-day maintenance of facilities, equipment, and infrastructure.

Big Lake NWR Objective 5-2: Volunteers, Partners, and Friends

Expand the volunteer and intern program, establish a Friends Group for the refuge, and cooperate with partners to accomplish refuge goals and objectives.

Discussion: The refuge manager supervises and trains volunteers on an as-needed basis. Volunteers are managed by refuge staff to help with maintenance and to conduct wildlife surveys. A volunteer program needs assessment has not been conducted. Volunteer position descriptions, that specify duties and assignments, have not been prepared. Volunteers are not actively recruited for the refuge. Proper workspace, materials, and equipment are provided to the volunteers so that they can work safely and properly.

The refuge partners with various other agencies, especially the AGFC, and is committed to establishing a Friends Group.

Strategies:

- Recruit a park ranger (Visitor Services) to be stationed at Wapanocca NWR, but would also serve Big Lake NWR as coordinator for volunteers, interns, and Friends Group programs.
- Work with the regional volunteer coordinator to develop and implement a volunteer plan for the refuge.
- Identify specific volunteer opportunities and prepare job descriptions for which volunteers and interns might be suited, such as office help, maintenance, environmental education, outreach, wildlife surveys, and duck banding.
- Incorporate volunteer, intern, and Friends recruitment into public presentations and media outreach.

- Adopt a volunteer recognition plan that includes awards for volunteering a certain number of hours.
- Over the long term, provide two volunteer camper pads, if feasible and desirable, for long-term refuge volunteers.
- Coordinate with universities in Arkansas and elsewhere to recruit high-quality interns to assist the refuge with operations, inventory, and management programs.
- Cooperate closely with staff from other government agencies, non-governmental organizations, and community groups to establish and nurture partnerships that would provide mutual benefits for those involved and help achieve refuge goals and objectives.
- Identify and facilitate a core group of individuals that is concerned with the interests and needs of the refuge, and coordinate with them to initiate and establish a Friends Group for Big Lake NWR.
- The refuge manager and Visitor Services specialist should attend Friends Group training.

Big Lake NWR Objective 5-3: Facilities, Infrastructure, and Equipment

Acquire and maintain all of the facilities, infrastructure, and equipment necessary to perform habitat management, restoration, and improvement on the refuge, in addition to maintaining and improving essential infrastructure, such as roads and levees.

Discussion: The current refuge office at Big Lake NWR, located approximately 3 miles east of Manila, Arkansas, in Mississippi County, and built in 1976, is substandard and inadequate to meet administrative and visitor service needs. Entry points, interior workspaces, and public areas, including restrooms, are not fully accessible. The exterior and interior walls are deteriorating and failing, the roof needs to be replaced, a restroom does not function, the HVAC system is inefficient, offices are not sufficiently lighted or ventilated, and health and safety issues exist. Furthermore, there are no suitable spaces for staff/partners meetings, visitor reception, or exhibit areas for education/interpretation. The building is unsightly due to its condition and appearance. Rehabilitation or renovations are not cost effective or desirable.

Funding has been obtained through the ARRA for replacement of the existing office with a suitable facility. The proposed headquarters/visitor contact station would be 1-story, approximately 2,500 square feet in size, and would include 4 staff offices, conference room, break room, unisex staff restroom, law enforcement storage, utility/storage closets, fax/photocopy/file room, mudroom, separate male/female public restrooms, an exhibit area, and volunteer/receptionist area. This facility would be fully ADA-compliant, would provide adequate administrative function, and would enable suitable opportunities for visitor reception and interpretation. The building would incorporate green-building design features, including energy-conserving lighting, HVAC, insulation, water-conserving systems, and options for alternate energy. It also would provide a safe and comfortable environment for staff and visitors. The current office would be removed and the new headquarters/visitor contact station would be sited within close proximity to the current building within the existing office/maintenance shop grounds, which are already disturbed; therefore, new construction would necessitate minimal site disturbance and no wildlife habitat would be destroyed. The funding amount (approximately $650,000), would include planning/design, engineering, construction, furniture, and interpretive exhibits.

The maintenance facility at Big Lake NWR is deteriorating, failing, and is inadequate and unsafe for staff using the premises. The building elevation is improperly sited and up to 50 percent of the building floods during heavy rains, placing employees at risk from electrocution and injury from slipping and falling. Additionally, the building does not have properly enclosed space for servicing or

repairing heavy equipment, and the outdoor pole shed is not large enough to allow all the refuge's heavy equipment to be stored under roof and adequately protected from the elements.

Funding (approximately $590,000) has been obtained through the ARRA for replacement of the existing shop building with a suitable facility of approximately 3,000 square feet that would include 2 enclosed drive-through bays, concrete floors, adequate storage for materials and supplies, vehicle lift, environmentally sound vehicle wash pad, and outdoor equipment storage with an insulated roof. The new building would be located on approximately the same site as the existing building, thereby minimizing site disturbance, and not destroying any wildlife habitat. The building would use energy-conserving features, such as efficient HVAC, lighting, and water systems, and potential alternate energy sources. The current building would be removed, but existing shop yard, vehicle approaches, and parking areas would be utilized for the replacement facility.

Utilizing and sharing equipment with Wapanocca NWR and the Complex generally would help reduce extensive equipment purchases for Big Lake NWR. The refuge does need additional equipment to improve moist-soil management capabilities, such as a larger tractor and implements.

Strategies:

- Replace the existing refuge office at the same location with a 2,500-square-foot headquarters/visitor contact station, using ARRA funding (approximately $650,000) and incorporating green-building design features to provide adequate facilities to meet the expectations and needs of the visiting public, to conduct visitor services programs, to facilitate work with partners, and to enable refuge staff to administer programs and operations.
- Replace the existing maintenance shop and equipment storage pole shed at the same location with an approximately 3,000-square-foot structure using ARRA funding (approximately $590,000), and incorporating green-energy building design features to provide sufficient facilities that would enable employees to work in a safe environment, to increase capability to accomplish refuge projects, to provide adequate equipment maintenance and storage space, and to protect refuge investments.
- Acquire a tractor and special attachments to enhance the refuge's moist-soil management capability, and other specialized equipment necessary to maintain the refuge's facilities and infrastructure.
- Keep all machinery, equipment, facilities, and infrastructure in good working order by regular upkeep and maintenance.
- Recruit an engineering equipment operator to operate and maintain equipment and infrastructure (accomplished January 2009).
- Recruit a laborer to assist with day-to-day maintenance activities.
- Annually update and maintain the Equipment Priority Index (EPI) report to identify station heavy equipment needs.
- Construct a heavy equipment wash pad area that meets environmental requirements adjacent to the existing equipment storage shed.
- Replace heavy equipment within the guidelines and time frames established by the regional heavy equipment coordinator.

CACHE RIVER NATIONAL WILDLIFE REFUGE

NOTE: All goals, objectives, and strategies described below for Cache River NWR are set in the time context of the 15-year planning cycle of this CCP.

FISH AND WILDLIFE POPULATION MANAGEMENT

Cache River NWR Goal 1: Manage and protect migratory birds and native wildlife populations on Cache River NWR to fulfill the purposes for which it was established and to contribute to the mission of the Refuge System.

Discussion: Each refuge in the Complex was established for the purpose of providing for the needs of migratory waterfowl. Cache River NWR was established to protect significant wetland habitats and provide feeding and resting areas for migrating waterfowl. As one of the few remaining areas in the LMRV not drastically altered by channelization and drainage, the Cache River basin contains some of the most intact and least-disturbed bottomland hardwood forests in the Mississippi Valley region. This unique and valuable wetland complex has been recognized by the Ramsar Convention as a "Wetland of International Importance."

Cache River NWR Objective 1-1: Migratory Waterfowl

Provide habitats on Cache River NWR sufficient to meet the habitat and population goals of the NAWMP as stepped-down through the LMVJV.

Discussion: The MAV is an important ecoregion for migrating and wintering ducks and geese in North America. Cache River NWR provides important foraging and resting (sanctuary) habitats within the MAV for waterfowl and serves in an integral role in both the NAWMP and LMVJV.

Concern over waterfowl population declines in the 1980s resulted in establishment of the NAWMP, which focused the attention of federal, state, and private conservation groups on critical wintering and breeding areas. The LMVJV, which encompasses all four refuges in the Complex, was selected as one of the wintering habitat focus areas. One of the first tasks faced by the LMVJV was to develop a model or decision tool for determining how much habitat was needed, and a method for relating this objective to the population goals of the NAWMP. The solution was to consider wintering areas as responsible for contributing to the spring breeding population goals of NAWMP, proportional to the percentage of ducks historically counted in wintering areas (Loesch et al., 1994, Reinecke and Loesch 1996). In order to contribute ducks to spring breeding populations, wintering areas must provide sufficient habitat to ensure adequate winter survival. To quantify winter habitat requirements, the LMVJV had to identify limiting factors and made an assumption that foraging habitat was the most likely factor to limit waterfowl populations in the LMV (Reinecke et al., 1989). The process of relating habitat objectives for individual management areas to overall habitat objectives for the LMV involved several steps (Biological Review for Bald Knob and Cache River NWRs, USFWS 2008). Step-down objectives were established for Cache River NWR (Table 10). Duck-energy day (DED) objectives were calculated by multiplying the acreage objective by the assumed DED standard developed by the LMVJV for that habitat type.

The intensity of waterfowl hunting activities and large harvest numbers in Arkansas create the need for providing waterfowl sanctuaries on Arkansas' national wildlife refuges. Activities such as maintaining body temperature, searching for food and roost sites, molting, courtship, pair bonding, and avoiding disturbance are energy-consuming activities for waterfowl in winter. Sanctuaries provide secure areas where waterfowl can rest and perform these activities with a minimum of

interruption and disturbance, and thus, less energetic cost. Sanctuary areas are critical for waterfowl to allow them to conserve energy to survive the winter period and physiologically prepare for undergoing other life functions, particularly northward migration and reproduction. Due to its strategic location in the heavily hunted MAV, coupled with the ability of this refuge to manage for a concentrated source of high-quality waterfowl food resources, Cache River NWR fulfills an important role as a waterfowl sanctuary. This function must be maintained on the refuge in order to provide areas free from disturbance for wintering waterfowl. Providing waterfowl sanctuaries is critical to the refuge achieving its legislated purposes and the mission of the Refuge System. Cache River NWR currently has only 8 percent of its acreage in waterfowl sanctuary status.

Table 10. Cache River NWR - Current migrating and wintering waterfowl foraging habitat objectives established by the LMVJV

Habitat	Objective[1] Acres (DED)[3]	Current Capability[2] Acres (DED)[4]	(+ or -) Acres (DED)
Moist-soil	490 (679,140)	81 (151,308)	-409 (-527,832)
Bottomland Forest	850 (107,100)	850 (162,350)	0 (+ 55,250)
Unharvested Crop	1,360 (17,165,920)	767 (10,784,540)	- 593 (-6,381,380)
Harvested Crop	0 (0)	591 (169,698)	+ 591 (+169,698)
Total	**2,700 (17,952,160)**	**2,289 (11,267,896)**	**- 411 (- 6,684,264)**

[1]Acreage and DED objective provided by the LMVJV office.
[2]Current acreage and DED capability (has levees and water control structure, some have pumping capability) provided by refuge staff.
[3]DED estimates, calculated by using standard DED figures provided by LMVJV.
[4]Updated DED estimates adopted by the LMVJV Waterfowl Working Group in June 2006: moist-soil, 1,868 DEDs/ac; bottomland hardwood, 191 DEDs/ac; unharvested crop, 14,061 DEDs/ac (estimate based on actual acres of various grain crops left unharvested and flooded during the winter period); harvested crop, 287 DEDs/ac (estimate based on actual acres of various harvested grain crops flooded during the winter period).

Strategies:

- Annually provide 100-200 acres of flooded habitats for early migrating waterfowl (e.g., Teal and Northern Pintail) beginning no later than September 1.
- Integrate water management for shorebirds and early migrating waterfowl as feasible.
- Flood additional acreage from November through December to continually provide food resources for wintering waterfowl and meet the refuge's foraging habitat objectives.
- During the period from January into April, slowly decrease water levels in selected impoundments to concentrate invertebrates for spring migratory birds.

- Record management actions by type and date for each waterfowl impoundment to document vegetation response by species and estimated food production, and document habitat use by waterfowl via waterfowl surveys conducted at least twice monthly from November through February, and once monthly in September, October and March. Use monitoring results to adapt waterfowl habitat and population management as necessary to meet objectives.
- Annually review waterfowl objectives set for the refuge and compare with actual performance to determine if refuge and landscape-level (e.g., LMVJV) objectives are being met.
- Develop and implement a step-down water management plan for the refuge, to include flood dates and drawdown dates for all water management units.
- Coordinate with AGFC and the LMVJV to determine the need for additional waterfowl sanctuaries of appropriate type, size, and location within the refuge and establish those areas with signage, depicting them on maps and brochures, and implement appropriate restrictions. New acquisitions proposed for designation include portions of Bayou DeView LTD and the King Lake Tract.

Cache River NWR Objective 1-2: American Woodcock

Enhance American Woodcock habitat to contribute to the objectives of the American Woodcock Management Plan.

Discussion: American Woodcock are migratory game birds that occur throughout the forested portions of the eastern United States. Cache River NWR is within the Central Region as designated for administrative purposes. Woodcock populations in this region have declined 19 percent since 1968, probably due to land use changes associated with land conversion and the maturing of forest habitats.

The American Woodcock Management Plan (U.S. Fish and Wildlife Service) was completed in 1990, and included an objective to protect and enhance wintering and migrating habitat on public lands to increase woodcock carrying capacity. Other objectives established in the plan included inventorying and monitoring woodcock habitat and developing management demonstration areas.

Woodcock are dependent on specific habitat conditions including availability of earthworms, their major food source (Krementz and Jackson 1999). Wintering habitat for woodcock includes moist bottomland hardwood forests with brush and understory, especially when found in close association (within about 0.5-mile) with agricultural fields and “old field” succession. These sites are typically thickets with spongy wet soil, a high density of vertical plant stems, but with sparse ground cover below. Typical cover includes privet, cane, and briars that result from openings in the canopy. The scrub-shrub and dense bottomland hardwood habitats created to benefit priority forest interior nesting birds (Swainson’s Warbler and Cerulean Warbler) will also provide good daytime cover for woodcock.

At dusk, most woodcock move to open or brushy fields to forage and conduct courtship activities throughout the night. These habitats include agricultural fields that were not fall disked and sparse grasslands that may have received a cool fall burn to create patchy openings of exposed soil interspersed between grass clumps 1-3 feet in height. The grassland and some field crop areas of the refuge provide this specific habitat preferred by woodcock, as well as other priority species (e.g., Northern Bobwhite, Dickcissel, and other grassland birds).

Strategies:

- Inventory and assess suitable woodcock habitat on the refuge.
- Conduct surveys at least twice monthly from mid-November to mid-February to document occurrence, estimate population density, document migration chronology, and determine nocturnal habitat use.
- Create suitable diurnal habitat in existing forest stands through thinning and patch clearcuts.
- Create and maintain preferred nocturnal habitat that consists of openings at least 5 acres in size and situated within 0.5-mile of good diurnal habitat (e.g., wet agricultural fields, wet afforestation sites, and grasslands) containing exposed soil and patchy cover 1-3 feet in height.
- Continue to restrict or eliminate fall disking of crop fields that would reduce earthworm numbers.

Cache River NWR Objective 1-3: Shorebirds

Annually provide a minimum of 50 acres of mudflats, principally on former WRP tracts, so as to provide fall (southbound) migration habitat for shorebirds in contribution to the objectives set in the U.S. Shorebird Conservation Plan, Lower Mississippi Valley/West Gulf Coastal Plain Shorebird Management Plan, and by the LMVJV.

Discussion: Several recently acquired WRP tracts, including Howell, Revel, and Dark Corner, contain numerous impoundments that provide opportunities for shorebird management. On a rotational basis, mudflat habitat can be created by disking during the dry years or by herbiciding emergent vegetation (primarily water primrose) during the wet years and then reflooding naturally or by pumping. Monitoring vegetation and shorebird responses to these management techniques will be necessary in order to adjust management actions accordingly (i.e., adaptive management).

Strategies:

- Create mudflat habitat in selected impoundments by disking during the dry years or by herbiciding emergent vegetation (primarily water primrose) during the wet years and then reflooding naturally or by pumping.
- Conduct weekly shorebird surveys during late summer and early fall, and analyze data to determine species numbers, migration chronology, impoundment use based on habitat conditions (e.g., water depth and minimal pool size), and adapt habitat management as needed.
- Monitor shorebird numbers to help evaluate underlying assumptions of the regional Shorebird Conservation Plan by contributing to estimates of the number of birds moving through the area and the amount of time spent during migration.

Cache River NWR Objective 1-4: Colonial Waterbirds/Wading Birds

Provide critical habitats for long-legged wading birds to contribute to objectives set forth in the North American Waterbird Conservation Plan.

Discussion: Cache River NWR provides habitat for breeding and wintering colonial waterbirds in shallow water areas, forested wetlands, and along the banks of the Cache River. Although management of this group of species is not a major priority for the refuge, management for shorebirds and waterfowl can also provide foraging habitat for wading birds. Additionally, there is a need to identify rookery sites, document breeding bird numbers and production, and identify areas to be protected from disturbance.

Strategies:

- In association with management for shorebirds, provide areas of shallow water and mudflat habitat that will also provide suitable conditions for wading birds.
- Monitor nest production and identify areas that need to be protected from disturbance during the breeding and fledging periods.

Cache River NWR Objective 1-5: Marshbirds

Provide high-quality breeding marshbird habitat where possible in conjunction with meeting waterfowl and shorebird habitat requirements.

Discussion: Loss of freshwater emergent wetlands has occurred throughout the southeast as development pressures have increased. The King Rail is thought to have been seriously impacted and there is great concern over inland numbers of this secretive marshbird. The Least Bittern is another species of high concern. Marshbirds occurring at Cache River NWR rely on emergent vegetation, thus the needs of these species should be considered within the context of management of moist-soil units for wintering waterfowl and Wood Duck brood and rearing habitat. Ideal secretive marshbird habitat ranges from 40 to 80 percent coverage for emergent vegetation, with little to any woody vegetation.

Current secretive marshbird habitat on the Cache River NWR, such as semi-permanently or permanently flooded marshes with emergent vegetation like cattails and rushes (*Juncus* spp.), are limited primarily to WRP impoundments, low sinks, or beaver ponds in recently reforested areas. Also some of the shallow oxbow lakes may have limited habitat around their edges.

Strategies:

- Implement marshbird surveys for a better understanding of species occurrence, numbers, and habitat use on the refuge.
- Continue to survey secretive marsh birds using playback calls during May and June in sites surveyed by Budd and Krementz in 2005-06. Establish additional survey points as needed to determine habitat use/preference.
- Use mowing, disking, or herbiciding to maintain suitable habitat in areas identified through surveys by reverting succession every 5 to 8 years, depending on the percentage of marsh in emergent and woody vegetation.
- Where appropriate, implement marsh restoration projects to convert areas to suitable habitat for marshbirds.
- Determine minimal patch size necessary to manage habitat in blocks of sufficient size to contribute to population and not create predator sinks.

Cache River NWR Objective 1-6: Forest Breeding Birds

Provide sufficient forest habitat to support priority forest breeding birds in the MAV (Bird Conservation Region 26) through forest restoration on newly acquired parcels and management of existing forested tracts.

Discussion: In many areas of the LMV, minimum forest block size, forest fragmentation, and poor stand quality are issues affecting forest breeding birds and other wildlife species. Cache River NWR is an important component of a larger forested landscape held in public ownership, including Dagmar WMA, Henry Gray/Hurricane Lake WMA, Rex Hancock/Black Swamp WMA, and White River NWR.

The large block of contiguous forest on the Cache/White River ecosystem is now considered the most important in MAV. The Partners in Flight Bird Conservation Plan for the MAV (Twedt et al., 1999) established avian population goals to support source populations of high-priority species in contiguous bottomland hardwood forests. Species and recommended minimal patch size for numerous bottomland hardwood bird species are listed in Table 11. For example, the minimal patch size required to maintain a source population of 500 breeding pairs of Swainson's Warblers and Prothonotary Warblers is 10,000 acres and 20,000 acres for Cerulean Warblers. A block of 100,000 acres is a minimal patch size that will support 80 breeding pairs of Swallow-tailed Kites.

Within the Cache River NWR acquisition area and adjacent public lands (old White River North Bird Conservation Area), there is one contiguous block greater than 10,000 acres but smaller than 20,000 acres, and five blocks of contiguous forest greater than 20,000 but less than 100,000 acres. The largest forested block totals 72,984 acres. While some of the refuge's forested tracts are separated by agricultural fields, there is great opportunity for re-establishing contiguous tracts as the refuge continues to expand and reforest. Furthermore, forest stand quality can be improved, using appropriate silvicultural treatments.

Forest restoration in areas adjacent to existing forest blocks will increase forest block size to benefit more area-sensitive breeding birds and might reduce potential depredation and parasitism by Brown-headed Cowbirds. If forest restoration is considered, placement adjacent to current blocks would provide habitat for several years for early forest successional species such as Northern Bobwhite Quail, and for forest edge species, such as Painted Bunting and Bell's Vireo. Over time, maturation of the restoration sites would increase the current forest block size and re-connect disjunct forested blocks.

Strategies:

- Maintain or increase complexity of forest habitat structure to achieve desired conditions for priority breeding bird species with appropriate silvicultural practices, including creating canopy openings that allow sunlight to reach the ground and simulate increased ground and understory cover.
- Where appropriate, continue forest restoration in areas adjacent to other forest blocks to increase block size and provide suitable habitat for early successional species.
- In select areas, maintain at least 70 percent forested cover within a 6-mile radius of prime nesting habitat to reduce nest predation and brood parasitism.
- Maintain scattered patches of understory to increase first-year bird survival, and to provide foraging opportunities for migratory birds.

Table 11. Hypothesized forest area required to support viable populations of 500 breeding birds within the MAV

Species	Patch Size (Acres) Recommendation	Habitat Area (Acres) Objective
Swainson's Warbler	12,079	10,280
Cerulean Warbler	20,560	20,560
Swallow-tailed Kite [a]	102,800	102,800
Prothonotary Warbler	6,939	10,280
Northern Parula	7,710	10,280
Hooded Warbler	6,425	10,280
Kentucky Warbler	21,588	20,560
Yellow-billed Cuckoo	16,962	20,560
Wood Thrush	7,196	10,280
Louisiana Waterthrush	18,504	20,560
Acadian Flycatcher	7,196	10,280
Eastern Wood-pewee	14,135	20,560
Yellow-throated Vireo	20,303	20,560
Yellow-throated Warbler	20,046	20,560
Blue-gray Gnatcatcher	10,280	10,280
Summer Tanager	16,962	20,560
Great-crested Flycatcher	18,504	20,560
Red-shouldered Hawk	148,546	102,800
Scarlet Tanager	12,593	20,560
Red-eyed Vireo	4,626	10,280
American Redstart	11,822	10,280
Broad-winged Hawk	259,570	102,800
Pileated Woodpecker	48,830	102,800
Cooper's Hawk	115,650	102,800
White-breasted Nuthatch	22,102	20,560

Source: Mueller et al. 1999.

[a] *Based on Cely and Sorrow (1990), a 40,000 ha patch of bottomland hardwood forest would only support approximately 80 pairs of Swallow-tailed Kites. A secure (source) population would realistically have to be based on a regional (southeastern U.S.) population.*

Cache River NWR Objective 1-7: Scrub-shrub or Early Successional Birds

Provide suitable habitat for high-priority scrub-shrub bird species in the MAV (Bird Conservation Region 26) through forest restoration and/or development and maintenance of early successional habitat.

Discussion: Scrub-shrub and early successional bird species as a group have continued to decline in the southeastern United States and would benefit from increased maintenance and restoration of suitable habitat on Cache River NWR. Due to the amount of recent reforestation on the refuge, a substantial acreage of early successional habitat is currently being provided. In time, most of the reforested sites will transition to mature forested stands. While reforestation and provision of habitat for species associated with forested habitats is the highest priority, it is important to routinely evaluate the availability of early successional habitats. Additional areas of the refuge could be maintained in an early successional condition, perhaps with the use of prescribed fire on a 5- to 10-year rotation. In addition, buffer strips along forest field edges and crop fields, as well as narrow corridors linking fragmented forest patches, could be managed as scrub-shrub habitat. These practices would benefit the highest priority scrub-shrub species, as well as other important early successional species including Field Sparrow, Orchard Oriole, White-eyed Vireo, Northern Bobwhite Quail, and Bell's Vireo. Additionally, Northern Bobwhite Quail would be positively influenced by management directed toward early successional and scrub-shrub management. Quail population restoration recently has been designated as a major management initiative throughout Arkansas by AGFC.

Strategies:

- Where and when appropriate, continue forest restoration in areas adjacent to existing forest blocks to expand block size and provide habitat for early successional bird species.
- Maintain early successional/scrub-shrub habitats in selected areas to provide permanent habitat for bird species dependent on such habitats.

Cache River NWR Objective 1-8: Grassland Birds

Provide suitable habitat for high-priority grassland birds in the MAV (Bird Conservation Region 26) through management of moist-soil units and old fields.

Discussion: Although management for grassland birds is not a priority at Cache River NWR, some breeding species (e.g., Dickcissel, Eastern Meadowlark, and Northern Bobwhite Quail) and some winter species (e.g., Henslow's Sparrow, Sedge Wren, LeConte's Sparrow, Northern Harrier) will benefit from provision of this habitat in larger blocks (25-100 acres). In areas where it is feasible and does not compete with reforestation efforts or waterfowl/shorebird management, agricultural areas should be converted to native grasses and forbs.

Habitat conversions should not result in weeds that characterize idle agricultural land, but should involve an intentional planting of warm season bunch grasses (e.g., little bluestem, Indian grass) and a large component of native forbs. Such grass-forbs areas will require periodic disturbance (mowing or burning) to maintain vigor.

Land parcels that are distant from existing forests (e.g., some Farm Service Agency tracts) may be suitable for development and maintenance of additional grass-forb habitat, provided they would not function as habitat sinks. These areas could be planted heavier to grasses and as a result may be more beneficial to birds breeding or wintering in grasslands.

Strategy:

- Provide a minimum of 30 acres of native warm season grasses dominated by bunch grasses and native forbs to benefit grassland birds.

Cache River NWR Objective 1-9: White-tailed Deer

Maintain a healthy deer herd with a balanced sex and age structure at a level consistent with long-term habitat capability, and provide opportunities for quality recreational hunting.

Discussion: Although not a federal trust species, white-tailed deer are important to the public as a game species and are a popular subject for observation and photography. Deer utilize a wide range of habitats and most refuge management actions aimed at priority species, such as migratory birds, will also provide direct benefits to deer.

Deer are commonly observed on the refuge and generally appear to be abundant. A deer herd health check conducted by SCWDS in the early 2000s, determined that the population was healthy and below carrying capacity. A subsequent health check conducted by SCWDS in 2007, indicated that deer on the south part of the refuge were in good physical condition and the herd appeared to be below carrying capacity. However, deer collected by SCWDS in the central part of the refuge showed signs of a higher population size that was nearing carrying capacity. Consequently, SCWDS recommended reducing the population to a more healthy level, using public hunting as the management tool. Harvest densities, based on AGFC check station reports, have been less than one deer per 200 acres, which is considered a low harvest. The refuge conducts a 2-day, either-sex youth hunt, a 7-day either-sex Quota Gun Deer Hunt, a 5-day either-sex muzzleloader hunt in October, and a 3-day either-sex muzzleloader hunt in late December. The archery season is open from October 1 to February 28, and is also an either-sex hunt. Currently, specific population objectives for the herd have not been established. Biological data from harvested deer were collected during the 2007 season to help begin formulating a data set that over time will help determine density-dependent parameters about the herd condition, and make inferences about the population.

The refuge consists of a mixture of farm fields, afforestation, moist-soil impoundments, and bottomland hardwood forests that create a habitat mosaic that provides excellent cover and forage for deer and other wildlife. Prior to refuge acquisition, much of the hardwood forest was actively logged for timber production, especially the portion formerly owned by the Potlatch Corporation. These harvested areas provided abundant food and cover for deer. Similarly, habitat management activities implemented for trust species, particularly forest management activities, will coincidentally increase the quality and quantity of deer habitat.

Strategies:

- Continue to collect biological harvest data during the refuge Quota Gun Deer Hunt and other hunts if feasible, in order to collect sufficient data to make inferences about the deer population.
- Determine herd condition/densities relative to carrying capacity by analyzing harvest data and interpretation of density-dependent factors, such as age-specific weights, antler characteristics, and reproduction.
- Determine age structure and buck:doe ratio of deer population by analyzing and interpreting harvest data.

- Determine current herd condition/densities relative to carrying capacity and past disease history every 5 years through herd health checks conducted and analyzed by SCWDS.
- Set harvest objectives, monitor harvest and population trends, and then adjust harvests based on data in concert with AGFC to meet deer herd objectives.
- Use public hunting as the management tool to meet herd objectives.

Cache River NWR Objective 1-10: Eastern Wild Turkey

Continue habitat management activities that result in enhanced habitat for Eastern Wild Turkey and provide quality recreational opportunities.

Discussion: The Eastern Wild Turkey is the primary resident game bird in the ecosystem, as well as one of special public interest. Being most associated with mature hardwood forests, turkeys were once distributed throughout the ecosystem. However, today, due to habitat destruction and conversion of forests to agriculture, turkeys are generally restricted to the remaining larger blocks of forests, as well as adjacent afforestation and open fields. Despite quality habitat management, turkey populations can fluctuate widely due to a combination of factors other than habitat suitability itself. A disease outbreak can cause as much dilemma in good habitat as in bad. Weather conditions, especially during the spring nesting season, can determine reproductive success, regardless of habitat quality, and thus be a major limiting factor on turkey numbers. Wetter than normal weather during May and drier than normal summers adversely impact turkey production.

However, the primary limitation on Eastern Wild Turkey populations in the Cache River ecosystem is the limited acreage of forested lands above the 1- or 2-year floodplain. Although turkeys will readily roost over water, they require dry land for feeding on acorns and other hard-mast during the winter and early spring when flooding is most common. Flooding during the nesting season adversely impacts recruitment by destroying nests, and by directly affecting survival of young poults. Turkey populations in the area have demonstrated the ability to grow relatively rapid with several successive years of favorable water conditions, but are observed to decline as a result of late spring and summer flooding, particularly if it occurs in successive years. Turkeys are not a priority species for forest management on this refuge, and as such, their numbers may not be consistently maintained at optimum levels. However, many of the management activities implemented for priority wildlife, such as forest interior and early successional forest birds, will provide collateral benefits to turkeys.

Forest management can benefit turkeys by increasing the diversity and availability of foods, such as hard and soft mast, grasses, sedges, and forbs. Nesting habitat is often improved by selective thinning of trees that provides more ground cover for nest concealment. Removal of more than 50 percent of the overstory degrades turkey habitat in the short term by resulting in extremely dense undergrowth that is generally avoided by turkeys.

Turkey habitat is often enhanced by the presence of small, well-dispersed forest openings that contain grasses and forbs. These openings are especially important to turkey poults foraging for insects. Openings are also used for nesting and courtship activities. A large percentage of the refuge's open grasslands occur along utility rights-of-way and in newly reforested fields. Continued habitat management through timber thinning, along with land acquisition and reforestation, should increase turkey nesting cover and improve production of hard and soft mast food sources.

Turkeys are hunted on Cache River NWR where suitable habitat occurs and birds are available. Gobbler surveys were initiated on the refuge during spring 2007, as an index to determine general abundance and monitor population trends over time.

Strategies:

- Continue to conduct annual gobbler call surveys.
- Conduct turkey poult surveys in partnership with the AGFC to determine annual production.
- Monitor suitable habitat conditions for turkeys through existing forest inventory data and aerial photos.
- Continue to implement an active forest management program on the refuge, considering turkey habitat needs as appropriate when conducting forest and open land management activities.
- Partner with the National Wild Turkey Federation on habitat projects, where and when feasible.
- Set turkey harvest objectives, monitor harvest, and adjust practices as necessary in coordination with AGFC.

Cache River NWR Objective 1-11: Furbearers

Maintain healthy populations of furbearers consistent with habitat and population management objectives for priority species, and control nuisance animals when necessary.

Discussion: Raccoon, mink, muskrat, opossum, coyote, bobcat, beaver, nutria, river otter, red fox, gray fox, and striped skunk appear to be common on the refuge. Raccoons are well-adapted to all existing habitats, and opossum, coyote, foxes, and bobcat are more associated with drier forests and afforestation sites. Muskrat, river otter, beaver, and mink are associated with the more permanently inundated wetlands and bayous. Little data is available to provide formal population estimates for these species; however, general observations indicate that beaver and raccoon numbers have increased in recent years. These two species are of particular concern because of their potential to significantly impact habitat and other wildlife species. Raccoons have the potential to negatively impact nesting birds and carry infectious diseases, such as distemper and rabies. Flooding problems and associated negative habitat impacts resulting from beaver damming activities and damage to culverts, water control structures, levees, and roads are common. Numerous man-days and resources are expended dealing with these problems.

Strategies:

- Monitor population trends of terrestrial and semi-aquatic furbearer species and monitor damage to infrastructure, habitat, and other wildlife and take necessary action to prevent and control such damage.
- Continue to control, through trapping and shooting, nuisance animals and associated negative impacts to wildlife and their habitats and remove beaver dams as necessary to protect refuge and adjacent private property and habitat.
- Consider opening the refuge to fur trapping by permitted individuals or to the general public (according to state regulations and under a special use permit) to reduce and prevent damage to habitat and infrastructure, disease outbreaks, predation on nesting birds, and increasing cost of nuisance animal control.

Cache River NWR Objective 1-12: Small Game (Mammals)

Consider habitat needs of small game mammal species within management programs for trust species and provide for quality recreational activities.

Discussion: Gray and fox squirrels are abundant on the refuge where suitable, mast-producing forested habitat is available. Although they share habitats to some degree, gray squirrels are most common in deep woods, whereas fox squirrels prefer small woodlots and the edges of larger forested tracts. Their high recruitment rates (controlled largely by levels of available hard mast), high natural mortality rates, and other population processes indicate that no significant long-term changes in squirrel population densities are expected to occur in available habitat. Squirrel hunting is popular during the fall and winter and harvests are probably fairly high, but given the reproductive ability of this species, the harvest does not appear to negatively affect the population. Forest management activities enhance habitat quality for most species of small mammals, including squirrels.

Cottontail rabbits and swamp rabbits are relatively common and are hunted in late winter. Their numbers are largely controlled by habitat availability. The rabbit population is usually higher in and around afforestation sites. Similar to squirrels, the reproductive potential of rabbits is much higher than potential harvest and thus hunting is believed to be compensatory to other causes of mortality.

Strategies:

- Implement forest and open land management activities designed to benefit trust species that incidentally create and improve small game habitat.
- Continue to allow small game hunting.

Cache River NWR Objective 1-13: Black Bears

Maintain and enhance habitat to support a healthy and viable black bear population.

Discussion: Bears were once common in the Cache/Lower White Rivers system before large blocks of forest were cleared for farming and other purposes. By the early 1900s, black bears had been virtually eliminated from Arkansas except for a very small population that survived in the most remote portion of the lower White River. As a result of protection afforded by the refuge and state hunting regulations, black bear numbers increased significantly on the lower White River NWR and surrounding forested areas to the point that hunting was allowed for this species on private lands surrounding the White River NWR beginning around 2000.

Black bears are sighted on or near Cache River NWR several times a year. Sightings are probably transient adult males or dispersing juvenile males searching for unoccupied territory. Female bears, which are necessary for population expansions in an area, are not thought to occur on the refuge, with the possible exception of the large, forested Biscoe Tract on the southern end. Bears use large contiguous tracts of diverse and mature bottomland forests that can be interspersed with farmland and reforested areas to obtain their foraging, cover, and denning needs. As contiguous blocks of forests expand in size and number due to land conservation and afforestation, forests mature to hard mast-producing conditions, and existing forest blocks receive forest improvement treatments, bear numbers could increase on the refuge through natural bear dispersal. Additionally, populations could be augmented through repatriation or colonization.

Bear hair-snare surveys were conducted during the summers of 2007 and 2008 in the Biscoe area by refuge personnel, in cooperation with the AGFC, in an attempt to determine bear occurrence and sex ratios. Records of all bear sightings reported to the refuge office over the last 5 to 10 years have been maintained.

Strategies:

- Continue to conduct hair snare surveys to determine bear occurrence, densities, and monitor trends; expand surveys to entire refuge if warranted.
- Record and map all bear sightings.
- Consider bear habitat needs such as hard and soft mast, escape cover such as cane thickets, and den trees when conducting forest and open land management activities.
- Create large contiguous forest blocks through land acquisition and afforestation, whenever feasible.
- Monitor suitability of habitat for bears through existing forest inventory data and aerial photos.
- Coordinate bear management activities with AGFC.
- Consider bear repatriation in suitable habitat in unoccupied areas if appropriate.

Cache River NWR Objective 1-14: Bats

Maintain and enhance habitat to support a healthy, viable resident bat population.

Discussion: Several species of bats are thought to occur on the refuge, although no research or inventories on bats have been conducted. However, eight species of bats, including the Rafinesque's big-eared bat, were collected on the adjacent Rex Hancock/Black Swamp WMA during a research/monitoring project in the 1990s. Before management actions for the benefit of bats can be planned, a basic assessment of which species use the refuge needs to be conducted. Surveying for all species of bats on the refuge would be logistically time consuming and expensive. Other alternatives, such as literature searches, would help initiate a species list. Target species or species of concern could then be focused on for more intensive monitoring or research.

Strategies:

- Research the literature including range maps for species that should occur in east-central Arkansas.
- Conduct annual mist net surveys in different habitats throughout the refuge, with assistance from universities and volunteers.
- Maintain or improve bat habitats such as roosting, maternal, or feeding areas incidental to forest management activities for trust species.

Cache River NWR Objective 1-15: Reptiles and Amphibians

Maintain and enhance habitat for a diverse assemblage of reptile and amphibian species as important components of the ecosystem.

Discussion: Amphibian conservation and management are of great interest to conservationists due to global declines. Habitat loss, fragmentation, and degradation appear to be the primary factors influencing declines. This group of animals requires quality wetland habitat for its survival and it also serves as important indicators of environmental health. Reptiles and amphibians are in decline across the southeastern United States, due mostly to direct loss of habitat and adverse modification of habitat. The White/Cache Rivers watershed is a highly modified system as the result of extensive drainage, flood control, and clearing of forested lands for agriculture. These changes in habitat structure and hydrology have, without a doubt, similarly affected the historic distribution and populations of reptiles and amphibians. As such, Cache River NWR plays an important role in

conserving remnant habitat, as well as in restoring habitat and ecological functions for reptiles and amphibians in a largely agricultural landscape. The floodplain forests, sloughs, brakes, and isolated wetland habitats of the refuge are suitable for numerous species of reptiles and amphibians. No herpetological population or occurrence surveys have been conducted to date on refuge lands.

The riverine, floodplain forest, and isolated wetland habitats of Cache River NWR are suitable for numerous species of reptiles and amphibians. Many species of snakes, lizards, frogs, toads, salamanders, and turtles occupy the refuge. A 1985 species list (species known or expected to occur) for the adjacent White River NWR included 47 species of reptiles and 20 species of amphibians, lending perspective to the presumed diversity of herpetological resources of Cache River NWR. Also, reptiles and amphibians were surveyed by University of Arkansas at Monticello (UAM) personnel in the mid- and late-1980s on Rex Hancock/Black Swamp WMA and lands purchased for the refuge, as part of an overall research project of the Waterways Experiment Station in Vicksburg, Mississippi. Of the species potentially occurring on Cache River NWR, two species (mole salamander and western chicken turtle) have been recognized as Species of Greater Conservation Need by the State of Arkansas (Arkansas State Wildlife Action Plan 2006).

Cache River NWR has participated in the Service's Abnormal Amphibian Study to document amphibian abnormalities in refuge populations. This 3-year sampling period was initiated in 2006 by the refuge biologist. The survey has not yet indicated any problems on the refuge.

Strategies:

- Coordinate with partners (e.g., AGFC, universities, USGS) to conduct reptile and amphibian surveys, in various habitat types across the refuge.
- Restore and maintain habitat connectivity to allow reptiles and amphibians unrestricted movement among habitats, thus ensuring that life cycle and resource needs are met.
- Restore and maintain health of wetland and terrestrial ecosystems and associated hydrologic function.

Cache River NWR Objective 1-16: Fisheries, Mussels, and Aquatic Habitat Management

Maintain and enhance riverine and floodplain aquatic habitats, and monitor fish and freshwater mussel occurrence and abundance.

Discussion: Flowing rivers and bayous, such as the White River, Cache River, and Bayou DeView, represent one form of permanent aquatic habitat on Cache River NWR. Abandoned channel scars in the form of open-water oxbow lakes or forested brakes provide most of the permanent lentic habitats. Many of these habitats are seasonally connected to rivers during flood events. The frequency and duration of connection is dependent on flood stages and the elevation of lakes. There are also a small number of man-made ponds and borrow pits. During large flood events, a major portion of the bottomland hardwood habitats found throughout the refuge serve as temporary habitats for many aquatic species. Many fishes use the flooded forests, sloughs, and lakes for spawning and/or nursery habitat. Fishes and freshwater mussels occupy rivers, bayous, and deep lakes on the refuge throughout the year.

The aquatic habitats within Cache River NWR support a large diversity of species. Some species popular with anglers include white crappie, black crappie, largemouth bass, spotted bass, bluegill, flathead catfish, and blue catfish. Many non-game and commercial fishes are also found in the various habitats of the refuge. At least 50 fish species are documented from the Cache River, Bayou DeView, and associated backwaters (Mauney and Harp 1979; Killgore and Baker 1996). Twenty-

nine species of larval fish were detected in the forested floodplain of the Cache River (Killgore and Baker 1996). Limited data exist to document occurrence of both adult and larval forms of fish species within refuge waters. It is likely that many species occur as larvae, juveniles, and adults.

Freshwater mussels are found throughout the refuge in flowing waters and to a lesser degree in permanent backwater sloughs and lakes. Specific information on the abundance, species richness, and distribution of mussels within the refuge is limited mostly to studies of the Cache River. Christian *et al*. (2005) surveyed the lower 42 miles of the Cache River and documented 26 species. Other authors previously documented an additional 13 species for a total of 39 known species (Wheeler 1914; Gordon et al., 1980; Ecological Consultants 1983; Jenkinson and Ahlstedt 1988). In 2007, the Service's Arkansas Field Office documented the presence of 20 species of mussels in Bayou DeView from Jackson County downstream to the confluence with the Cache River. There are no comprehensive studies characterizing the mussels of other tributaries of the Cache River or floodplain lakes.

Strategies:

- Work with partners to gather baseline data and conduct investigations on fish and mussel populations within the refuge.
- Continue to reforest cleared land in the floodplain to provide more complex cover and forage opportunities for larval, juvenile, and adult fishes that use the floodplain during flood events.
- Restore connectivity between rivers and floodplain lakes and/or forests through the following actions:
  - Remove or breach the levee along Jackson Bayou in the George Tract;
  - Remove the levee at the former Bayou DeView Ltd Tract near Bulltown on Highway 260;
  - Remove or breach the levee within the waterfowl sanctuary near Highway 145;
  - Remove the levee at the Jackson Tract;
  - Remove debris from the slough connecting Old River Lake to the White River.
- Attempt to acquire the small strip of private land that currently prevents land access to Slaughter's Lake (only if landowners are willing sellers).
- Participate in the planning of restoration and water development projects or regulatory actions that may affect fisheries and mussel resources within the Cache River NWR.
- Coordinate with the ANRC and other agencies, such as AGFC, NRCS, and COE, to establish minimum flows and/or establish flow allocations for Cache River and Bayou DeView.
- Participate in the development of the COE Section 1135 restoration project to redirect flows into historic channel meanders along the channelized lower seven miles of the Cache River.
- Continue to alert the COE about expected negative impacts to the hydrology of the lower White/Cache River ecosystem associated with the proposed White River navigation improvement project.
- Continue to coordinate with the Service's Ecological Services Office and the COE regarding planning for the removal of a blockage on the Cache River near Grubbs.

Cache River NWR Objective 1-17: Endangered Species and Species of Concern

Continue to support endangered species programs through research, surveys, recovery, and habitat conservation.

Discussion: During the winter, Bald Eagles commonly use Cache River NWR. They are often seen in open areas or near bodies of water searching for prey. Eagles frequently congregate near large

waterfowl concentrations during the fall and winter months. Additionally, Arkansas does have a breeding Bald Eagle population. In the past 5 years, two pairs of eagles have nested near Rainbow Lake and near Opossum Creek and both nests were successful.

Although Bald Eagles were recently removed from the endangered species list, they are still protected by the Bald and Golden Eagle Protection Act. Continued protection of Bald Eagles and monitoring to determine any potential breeding attempts is essential. The Service will continue to work with the AGFC for at least 5 years to monitor breeding. The refuge should encourage the public to report Bald Eagle nests and follow up on reports in conjunction with state agency biologists. If a nesting attempt occurs, appropriate buffer zones should be implemented to prevent any disturbance to the nesting pair. Nest monitoring to determine success of the nest will also be important.

Neither the Least Tern nor the Piping Plover has been documented on Cache River NWR, but it is likely that these two species use the refuge during spring and fall migration for a stopover site. The Wood Stork, which is not federally listed in Arkansas but is a species of concern, has been observed more frequently in recent years on the refuge during the spring and fall. Many high priority shorebird species move through the MAV during the spring and fall migration periods. They are particularly limited by foraging opportunities at mudflats during the fall migration from August to October. Availability of shallow water sites is low because much of this habitat is in cropland during this time. Improving water control and provision of shallow water impoundments on newly acquired WRP sites or sites being taken out of agricultural production and put into impoundments would benefit these two species and a number of other shorebird and wading bird species.

Several endangered mussel species occur in Arkansas and although none have been documented on the refuge, it is possible that they do occur here. The pink mucket, fat pocketbook and scaleshell occur on the White River. Two major threats to mussel species include sedimentation and chemical runoff from agriculture. Sedimentation is caused by a number of sources including agricultural runoff, headcutting in fields and drainage tributaries, stream bank erosion, and stream channel instability and degradation. A wide variety of chemicals are used in modern agriculture in Arkansas, including pesticides, herbicides, defoliants, and fertilizers. Some of these chemicals are detrimental to fish and wildlife when they accumulate in streams and water bodies. Malacologists generally agree that contaminants are partially responsible for the decline of freshwater mussels.

Few mussel surveys have been conducted on the Cache River NWR. Mussel surveys would provide baseline data on species occurrence and abundance and evaluation of how current land and management practices on the refuge might be impacting these species. Additionally, continued reforestation on the refuge will decrease fragmentation and potentially reduce sedimentation in water bodies occurring from agriculture and stream bank erosion.

Strategies:

- Continue to monitor Bald Eagle use of the refuge and implement appropriate protective measures during the nesting season when active nests are found.
- When Least Terns, Piping Plovers, or Wood Storks are observed on the refuge, note the conditions of the habitat being used and determine if this condition can be replicated in the future, while ensuring actions focusing on other refuge priorities are accomplished.
- Conduct surveys for listed mussel species in potentially suitable habitat, such as at Bayou DeView. If such species are found, note the condition of the habitat being used, determine if similar conditions occur elsewhere on the refuge, and in conjunction with AGFC, ensure appropriate protective measures are implemented.

Cache River NWR Objective 1-18: Ivory-billed Woodpecker

Continue to encourage organized searches for Ivory-billed Woodpeckers and implement appropriate protective measures and consultation when conducting management activities, or in the event of discovering an active nest or roost tree.

Discussion: Ivory-billed Woodpeckers (IBWO) once inhabited forested habitats throughout the southeastern United States and Cuba. Although there are little specific population data available, it is likely that European settlement and forest clearing caused the species to decline in the second half of the 19th century. By the mid-20th century, the IBWO was reduced to a very small population at the Tensas River in Louisiana, where the last widely accepted IBWO sightings occurred in 1944. Since that time there have been numerous unsubstantiated sightings throughout the historic range of the species. Many of these sightings seemed highly credible but lacked hard evidence.

In February 2004, Cornell Lab of Ornithology biologists became aware of a credible sighting of the IBWO on a portion of Bayou DeView, which is located on Cache River NWR. Subsequently, Cornell biologists and their partners documented the presence of at least one IBWO in that area. Sixteen sightings of the IBWO were reported deep within the cypress-tupelo swamp of the Bayou DeView in 2006.

Rediscovery of the Ivory-billed Woodpecker in 2004 on the Cache River NWR was announced in 2005. The larger area of the Big Woods of Arkansas includes several national wildlife refuges and state wildlife management areas that are considered to have potential habitat for this species. Additionally, efforts to educate the public on the Ivory-billed Woodpecker and document any potential reports of sightings are recommended.

Cornell University researchers, with assistance from personnel from TNC, AGFC, Audubon Arkansas, USFWS, and volunteers, have been searching the Big Woods of Arkansas, including the Cache River NWR, for the last several years. There have been many reported sightings, interesting audio, and other supporting data, but no additional video or still pictures have been recently recorded. The refuge has been supporting the search team. The refuge forester and wildlife biologist have been conducting IBWO habitat inventory and forest assessment to determine potential habitat.

The IBWO relies upon large forested blocks that produce sustainable amounts of forage and habitat. Key to the species occurrence is an ample food source of large beetles (e.g., cerambycids, buprestids) and larva found in recently dead and dying wood. The IBWO is the initial predator on insects that attack stressed trees and dying trees within the first few years of decay. Another element of habitat crucial to IBWO is a relatively high density of large trees. Large trees supply roosting and perching habitat, and an element of senescence that promotes development of a food source.

The IBWO relies on vegetable matter for a portion of its diet, so it is also dependent on habitats that are open to sunlight and produce soft mast. In his studies at Louisiana's Tensas River in the late 1930s, James Tanner estimated that the minimum area necessary for an IBWO pair under ideal habitat conditions was approximately 2.5 to 3 square miles (Tanner 1942), or 1,600 to 1,920 acres. This could range much higher under less desirable habitat conditions, even up to 17 square miles.

Tanner's study supports the thesis that the IBWO is dependent on large forest blocks with elements of stress or senescence. The decline in hardwood forest acreage in the MAV has had a direct adverse impact on the IBWO. Historically, the MAV contained over 24 million acres of nearly contiguous hardwood forest, but now only 8 million acres remain, approximately 600,000 acres of which occur in Arkansas. The pre-settlement forest was subject to natural disturbance from ice

storms, hurricanes, tornadoes, drought, and fire, all of which maintained a sporadic cycle of stress and insect infestation, and therefore a potential food source for the IBWO.

Currently, the remaining MAV forest is heavily fragmented and primarily concentrated along large riparian corridors, so now the natural disturbance factors impacting the MAV seldom impact large amounts of forest, and these remaining forest blocks are universally relied upon more heavily by all forest-dependent wildlife. The forest's structure and composition, more so than its age class, are important factors to these species and the IBWO. While some relic baldcypress and tupelo may be as old as several hundred years, the vast majority of MAV hardwoods may live less than 150 years, and will exhibit old age class characteristics in as little as 80 years. The Cache River NWR area is very productive with an average 10-year-diameter growth rate of 3.6 inches. The flooding regime and weather patterns are such that down wood rots quickly and the occurrence of fungi is prevalent. The site conditions of the Cache River area lend themselves to the production of diverse, verdant forest.

Potentially, several forest blocks within Cache River NWR are suitable or with active management can be enhanced to develop suitable conditions for the IBWO. Forest management at Cache River NWR has followed the guidelines of the Forest Habitat Management Plan (FHMP) and has been actively improving habitat for threatened and endangered species, migratory waterfowl, migratory birds, and other resident wildlife for several years.

The FHMP directed retention of large trees, cavity trees, and other trees that provide amenities to wildlife. The physical application of a treatment also results in some senescence when trees are damaged (e.g., tops broken, boles damaged, limbs broken). However, to additionally supplement the potential food source for the IBWO, other techniques could also be employed. When there is a need for increased IBWO foraging habitat, normal habitat treatments should be used to incorporate the improvements when possible. When stand inventories indicate a deficiency in senescence, some marked trees can be designated to be killed or damaged, instead of logged, as a condition of the sale. The number of supplemental "damaged" trees will be limited and directed towards meeting suggested IBWO foraging needs as developed through ongoing research. The number of supplemental damaged trees should not be applied to the point that it presents a hindrance to market, and thus precludes the treatment overall. Commercial sales should be a suitable means to accomplish this as is the case with most large-scale refuge habitat improvements. Non-commercial treatments of this nature bring about many questions of sustainability and are problematic in terms of funding.

There are numerous ongoing studies and efforts to better understand the IBWO and its habitat needs, necessitating flexibility of management techniques within the FHMP to adapt to new information. Foremost of the pending documents is the Recovery Plan for the IBWO, the draft of which was released in August 2007 (USFWS 2007b). Several members of the refuge staff are actively involved on the Recovery Team. Cache River NWR adapted forest management techniques as appropriate based on recommendations from the Recovery Team.

Strategies:

- Continue to actively participate in IBWO partnerships that include natural resources agencies, the Cornell Lab of Ornithology, and non-governmental organizations to continue searches for the IBWO in likely habitats.
- In the event of discovering a roost or nest cavity, refuge personnel will maintain an essential role of participating in planning and managing the response to such a discovery. Immediately begin consultation with appropriate federal and state endangered species biologists to implement appropriate protective and monitoring measures.

- Ensure appropriate protection measures for IBWO when conducting management activities on the refuge.
- Implement forest management actions that add forest structure and retain snags and many larger trees, in accordance with the Desired Forest Conditions standards at a minimum, and exceed these standards where consistent with other objectives.
- Assist with outreach and education efforts as feasible.
- Continue to participate in the Corridor of Hope Team and develop and distribute educational information regarding the IBWO and bottomland hardwood forests.

Cache River NWR Objective 1-19: Wildlife Investigations, Inventorying, and Monitoring

Improve and expand investigations, inventorying, and monitoring of the refuge's fauna and prepare and implement an Inventorying and Monitoring Plan (IMP).

Discussion: The Improvement Act formally establishes the necessity of monitoring the status and trends of fish, wildlife, and plants on national wildlife refuges. Service policy is to collect baseline information on key plants, fish, and wildlife to monitor, as resources permit, critical parameters and trends of selected species and species groups on and around Service units, and to base management on biologically and statistically sound data derived from such inventorying and monitoring (701 FW 2, Inventorying and Monitoring of Populations).

Monitoring, inventorying, and surveying (MIS) are very important means for scientifically managing trust wildlife populations and habitat, as well as meeting national, regional, and refuge goals. Before any MIS is started, the surveyor should seriously and honestly determine if: (1) Objectives, which are clear, specific, and measurable, are defined and can be practically met; (2) the results will actually be used to benefit the resource or make informed decisions; (3) quality and quantity of data needed to meet the objectives can be collected; (4) the MIS methodology is scientifically and statistically sound; (5) the costs of conducting the MIS are worth the results; (6) resources are available or will become available to complete the MIS; (7) the method of data analysis is pre-determined; and (8) MIS is prioritized so if resources become limited then more critical MIS will be conducted.

Adaptive management is a system used by refuge managers to improve results by documenting management actions, measuring and documenting biological responses, and adapting (modifying) management actions to improve desired conditions/outcomes and determine if objectives have been met. Baseline inventorying and population monitoring at regular intervals provide data essential for informed decision-making by refuge managers and are fundamental for adaptive management. Inventorying and monitoring needs can often be met with the assistance of other Service programs and cooperative efforts with state resource agencies, universities, and USGS. Proper attention must be given to experimental and monitoring design, statistical procedure, and consistency in observation and data collection.

The priority for monitoring will be directed toward obtaining baseline wildlife inventory data and monitoring trust species of special concern, such as Ivory-billed Woodpecker, King Rail, Prothonotary Warbler, Swainson's Warbler, American Woodcock, and Least Bittern. High-priority wildlife surveys include wintering waterfowl counts, waterfowl and shorebird response to moist-soil management treatments, and forest breeding bird response to forest treatments. Other valuable surveys and assessments include those conducted for secretive marshbirds, woodcock, reptiles and amphibians, bats, turkeys, black bears, furbearers, and white-tailed deer.

Strategies:

- Increase capability to conduct wildlife investigations, inventory, and monitoring by recruiting a biological technician for Cache River NWR and an ecologist and hydrologist for the Central Arkansas NWR Complex.
- Collect inventorying and monitoring data that contribute to assessment and decision-making regarding refuge wildlife management and facilitate adaptive management.
- Continue to coordinate with partners and universities, USGS, and others to conduct research, monitoring, and inventorying of wildlife resources on the refuge.
- Implement inventorying, surveying, and monitoring efforts for refuge wildlife resources according to the following relative priority:
  <u>High</u> – wintering waterfowl use, grassland and forest breeding birds, shorebirds;
  <u>Medium</u> – woodcock, secretive marshbirds, abnormal amphibians, black bear, wading birds, white-tailed deer;
  <u>Low</u> – turkeys, reptiles and amphibians, bats.
- Strive to develop data sets that are statistically robust so that analysis of monitoring results can be more useful in determining adaptive management responses if objectives are not being accomplished.
- Maintain adequate records of inventory and survey data in EXCEL, ACCESS, Arc-GIS or other databases so that data can easily be retrieved, compiled, and statistically analyzed, when possible, with software such as SYSTAT.
- Record survey activities and results in annual narratives or annual survey plans.
- Recruit assistance with wildlife inventorying and monitoring projects from volunteers, such as interns, retirees, and/or skilled volunteers from universities or conservation organizations (e.g., Arkansas Audubon), when time, personnel, and expertise are lacking at the refuge.
- In order to recruit the best volunteers and interns, provide suitable refuge housing, if possible.
- Use Adaptive Management, subject to resources and technical restraints.
- Coordinate with AGFC, USGS, COE, NRCS, and other organizations to design and conduct research that will provide refuge managers with information needed to improve wildlife management programs to better fulfill refuge purposes.

HABITAT MANAGEMENT

Cache River NWR Goal 2: Protect, restore, and manage the functions and values associated with diverse bottomland hardwood forests and open wetland systems in order to achieve refuge purposes, wildlife population objectives, and to benefit migratory waterfowl and other native wildlife.

Discussion: The first three goals for the LMRE, in which Cache River NWR is located, relate to conservation of habitats on behalf of wildlife:

1. Conserve, enhance, protect, and monitor migratory bird populations and their habitats in the LMRE.

2. Protect, restore, and manage the wetlands of the LMRE.

3. Protect and/or restore imperiled habitats and viable populations of all endangered, threatened, and candidate species and species of concern in the LMRE.

Cache River NWR Objective 2-1: Moist-Soil Habitat Management

Acquire, develop, and maintain additional areas for moist-soil impoundments on suitable tracts as they are acquired by the refuge to achieve refuge purposes and meet the LMVJV objective of 500 acres available for wintering waterfowl.

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

Although geese sometimes use moist-soil impoundments and consume shoots of germinating plants, rhizomes, roots, or tubers, the primary emphasis of moist-soil management is to produce seeds that will provide food for ducks. Most research has focused on estimating seed production. Studies have shown that under intensive management species of barnyard grass (*Echinochloa* spp.), sprangletop (*Leptochloa* spp.), flatsedge (*Cyperus* spp.), smartweed (*Polygonum* spp.), and panicum (*Panicum* spp.) can produce more than 1,000 pounds of seed per acre (Fredrickson and Taylor 1982). However, we know far less about production that might be occurring under current conditions in the LMV. Reinecke et al. (1989) used an estimate of 400 pounds per acre of moist-soil seeds to derive an average value of about 1,386 DEDs per acre for moist-soil units.

More recently, the LMVJV Waterfowl Working Group used available moist-soil seed estimates of nearly 500 pounds per acre reported by Kross (2006) to calculate an increased value of 1,868 DEDs per acre for this habitat. Regardless of the quantity of seed produced, moist-soil impoundments are highly recommended as a means of diversifying habitat (Fredrickson and Taylor 1982; Reinecke et al., 1989) and supplying food with nutrients not generally available in agricultural grains. Moist-soil management is best conducted in impoundments that have water control structures, are relatively flat, and have an adjacent well that can be used for irrigation and/or fall flooding. Eight to ten impoundments on the refuge totaling almost 500 acres possess such characteristics. The recently distributed *Moist-Soil Management Guidelines for the U.S. Fish and Wildlife Service, Southeast Region* (Strader and Stinson 2005) should be used as a guide to manage and evaluate the refuge's moist-soil management program.

Suitable habitat for shorebirds, waterfowl, and marshbirds can be provided over time by staggering the treatment rotation among the existing moist-soil units. For example, a unit that is disked will provide mudflats for shorebirds during that first year, annual grasses and sedges for waterfowl during years two and three and perennial vegetation for marsh birds during years four and five, at which time this unit could then be treated again to set back succession. In order to set back succession, woody vegetation cannot be allowed to grow to a point where it could not be controlled by disking, or spraying.

The timing of drawdowns in waterfowl impoundments on Cache River NWR to propagate moist-soil plants have ranged from mid-March, for annual smartweed production, to late-June to maximize barnyard grass production. Drawdown dates are generally dependent on habitat objectives, adjacent impoundment habitat objectives, and the amount of water in adjacent drainage ditches. Disking, flooding, mowing, herbiciding, and rotating with Japanese millet or agriculture crops are common practices used when nuisance plants comprise > 50 percent estimated cover and moist-soil plant production is $\leq$ 500 pounds per acre.

Strategies:

- Consult the *Moist-Soil Management Guidelines for the U.S. Fish and Wildlife Service, Southeast Region* manual for recommendations for management and evaluation of the refuge's moist-soil management program.
- Actively manage selected impoundments for moist-soil habitat on Howell, Revel, and Dark Corner WRP tracts and Dixie and Plunkett Farm Units.
- Acquire additional resources needed to manage these moist-soil units, including staff, installation of wells and gear-heads, power units, diesel fuel, water control structures, and a wide, heavy-duty disk.
- During the growing season, complete drawdowns, control beavers, conduct bi-weekly monitoring of vegetation to determine if treatment actions are needed, perform necessary treatments such as disking, herbiciding, fertilizing, or flooding as necessary to control nuisance plants, and produce $\geq$ 50 percent coverage of moist-soil plants or > 500 pounds of seeds per acre.
- Quantitatively record moist-soil management activities and associated plant responses in terms of desirable seed production and percent coverage of moist-soil plants; use these results to fine tune management activities (i.e., adaptive management).

Cache River NWR Objective 2-2: Forest Management

Manage forest habitats to provide a natural diversity of plant and animal species found in the LMRV to achieve refuge purposes.

Discussion: The Comprehensive Management Plan (CMP) for the Cache River and White River National Wildlife Refuges within the Cache/Lower White Rivers Ecosystem, approved in 1994, set the stage for managing these refuges as an ecosystem. The subsequent 2001 Forest Habitat Management Plan (FHMP) for Cache River and Bald Knob National Wildlife Refuges established the following forest habitat management objectives in order to achieve refuge purposes:

1. To protect, enhance, and restore critical forest habitats for threatened and endangered species of plants and animals indigenous to the refuge.

2. To protect, enhance, and restore hardwood forest habitat for migratory waterfowl use.

3. To protect, enhance, and restore a site-appropriate, diverse range of hardwood forest habitat for migratory and resident birds.

4. To protect, enhance, and restore hardwood forest habitats with adequate cavity densities, mast-producing components, and structure for other forest-dependent wildlife.

5. To provide compatible opportunities for wildlife-dependent recreation, environmental education, and forestry and wildlife research.

The first habitat inventory of Cache River NWR began in 2000, to develop baseline information for the FHMP. In order to inventory habitat types, the refuge was compartmentalized and 5 of these 20 compartments were selected for habitat inventory based on the diversity contained therein that represented the range of habitats occurring on the refuge.

In the coming years the remaining compartments will be inventoried in a similar manner. All compartments will be inventoried on a 10-year cycle, thus providing a continuous habitat inventory that can be used to track changes in habitat over time. These original inventories were taken through the Continuous Forest Inventory (CFI) survey process and provide the basis for much of the descriptions that follow. Additional inventories have since been taken. A 15-year evaluation/prescription cycle was proposed in the FHMP and several of the compartments have received an evaluation/prescription inventory. Additionally, in 2005 and 2006, there was an extensive inventory of habitat characteristics associated with occupation and use by the Ivory-billed Woodpecker. These latter inventories refined the results of the CFI. The descriptions that follow utilize information from all of the surveys to provide an overall picture of the forest types on the refuge.

Inventory results indicate that there is a wide diversity of habitats in the forestlands of Cache River NWR, but areas can generally be divided into seven categories:

1) Forestlands with no recent silvicultural manipulation [Retention] – 5,967 acres of retention forests occur on six compartments. These forestlands vary greatly from the other management categories. Overstory species composition tends to be dominated by shade intolerant species; however, lower canopy and understory species composition favor more shade tolerant species. Regeneration is severely limited to shade tolerant shrubs and a few trees. Average height of tree crowns is 10 percent greater than that of the comparison areas. Visible cavities are relatively few per acre, as are hollow trees, and woody debris levels are less than one-tenth of those recorded on comparison areas.

2) Forestlands previously managed for timber production [Timber Production] – 16,958 acres of timber production forests occur on nine compartments. Forestlands that were previously managed for timber production exhibit different characteristics. These stands were managed for the short-term production of red oak. Overstory species composition is dominated by shade tolerant species: sugarberry and green ash, and some intolerant species, overcup oak and a few red oaks. Lower canopies are of similar composition. However, understories contain a significant amount of red oak and overcup oak regeneration. While this area exhibits the least amount of hollow trees, it contains trees with the most visible cavities (mostly in sugarberry, perhaps a species specific tendency) almost four times as many as in forestlands with no manipulation.

3) Forestlands utilized for timber revenue [Revenue] – 11,979 acres of revenue forests occur on 13 compartments. These uneven-aged forestlands were generally never managed under a professional forestry plan and, consequently, severe disturbances to habitat were introduced, resulting in yet another set of distinct conditions. A mix of sweetgum, red oak, and red maple dominate overstories. The lower canopies and the understories are diverse in species composition, but the regeneration in particular contains far less than half of the number of red oak stems that is present in the area managed for timber production. This area contains ten times the amount of hollow trees as the other areas. Also, snags comprise 20 percent of the basal area. Ground cover vegetation is dominated by miscellaneous herbs, sedges, and grasses instead of the poison ivy, trumpet creeper, and red vine that are found to dominate the comparison areas.

4) Swamps, primary composition of Baldcypress/Tupelo with no recent silvicultural manipulation [Swamp] – 4,468 acres of swamp forests occur on four compartments. Extensive swamplands warrant a separate condition more because of stand characteristics than past management. These stands have all been logged in the past, generally during the period from 1920 to 1940, and then again from 1960 to 1970. Logging was extensive and removed a

large amount of old growth baldcypress; however, some baldcypress were left either because of size, infeasibility of logging, or poor grade. The cutover swamps responded with regeneration and release of tupelo stands beneath the residual trees. Currently, the swamps have a closed canopy with a basal area and stems per acre that averages almost twice that of comparison hardwood stands. The understory and midstories are diminished because of the dense overstory and standing water; shade intolerant regeneration is only around one percent. Swamps far exceed the other stands in amount of cavities, coarse woody debris, and standing dead tree volume.

5) Croplands now restored under refuge ownership [Reforestation] – 15,524 acres of former cropland undergoing reforestation occur on 14 compartments. This was marginal cropland being restored or reverting to forest or young hardwood plantation. After several decades of development, these habitats will be comparable to mature bottomland hardwood forests, but for now these stands are in the early stages of natural succession and therefore yield different habitat contributions than the mature forest. Long-term goals are to develop the stands into a diverse, mature forest. Mixes of suitable hardwood species were planted to fulfill objectives of site appropriate species diversity. In some cases where significant natural regeneration is present or adjacent seed sources abundant, active restoration was forgone to allow natural regeneration to take its course. Future restoration projects will concentrate on restoring new acquisitions, or other marginal cropland as determined by the forestry staff and refuge manager.

6) Small, linear, or irregular patches of forestland adjacent to streams, sloughs, etc. including the streams themselves, roads, and other Rights-of-Way [Riparian/Other] – 5,032 acres of riparian/rights-of-way forest occur in all 20 compartments of the refuge. The riparian and other portions of the forestland are not considered stands by themselves, and while inventories have recorded data from the riparian areas, the data have not been analyzed. These areas are important because of their position in the landscape, and will be managed in concert with the larger stands that contain them. Some of these areas are large and may receive silvicultural treatment if justified, while active management may never be desirable in other areas, or is inoperable for various reasons.

7) Lakes and other bodies of water completely open or containing only scattered trees [Open Water] – 1,010 acres of open water occur in 17 compartments. There are 87 bodies of water scattered throughout Cache River NWR. These are an integral part of the forest landscape for management considerations.

Each of the above forestland types contains desirable qualities and contributes to the forest complex. Through management prescribed in the FHMP, desirable qualities can be introduced in stands where they are lacking, and enhanced or maintained in stands where they are already present to some degree. From the FHMP, desirable qualities are:

- desirable vertical structure and levels of canopy openings,
- site appropriate species diversity,
- a sustainable proportion of desirable species in various developmental stages,
- a significant proportion of large trees with full crowns, and
- adequate numbers of cavities as well as cavity-producing trees.

It is necessary for forest managers to work with wildlife biologists to study the refuge and surrounding forests comprehensively, and then manage for appropriate target species for each block. Current research, literature review, and basic habitat modeling are essential to fully understanding the habitat needs of target species.

In order to accomplish the objectives of the refuge, the majority of refuge forests are managed under uneven-aged silvicultural systems. Uneven-aged management will promote many of the aforementioned desirable conditions. However, some shade-intolerant species and simple canopy conditions can best be promoted under even-aged systems. An emphasis is placed on designing management practices that will result in forest structure, composition, and condition that most resembles a natural system. These practices contribute to the widest diversity of indigenous wildlife species and habitat types. A full range of management alternatives and their impacts is considered during the prescription process.

While maintaining site appropriate species diversity, a large oak component is encouraged. Red oak acorns are an important food source for wintering waterfowl (Baldassarre and Bolen 1994; Smith et al., 1989). Active management is necessary to maintain a substantial component of oak in bottomland hardwood forests (Smith et al., 1989). The oak component is perhaps the most important for the refuge's target species.

Furthermore, silvicultural operations focus on intermediate thinnings to release and promote desirable advanced regeneration. Chemical injection, non-commercial treatments, or small controlled burns may be utilized to reduce undesirable species competition, or eradicate invasive exotics. In areas with insufficient regeneration, site suitable seedlings may be under-planted.

Also, intermediate actions concentrate on stimulating vigorous trees to develop full crowns for hard and soft mast production. Structural diversity is promoted in this uneven-aged management scheme, which provides habitats for the greatest variety of neotropical migratory birds and other forest wildlife. Vines, particularly those beneficial to wildlife, are encouraged to develop to promote structural complexity. A healthy herbaceous understory is encouraged to promote seed and tuber development and a healthy leaf litter that will stimulate invertebrate reproduction. The presence of several well-developed vegetation levels produces a complex habitat structure, resulting in higher bird species diversity (Thompson et al., 1993). Cavity trees are maintained in sufficient numbers throughout the refuge to support resident wildlife and nesting neotropical migratory birds. Also, larger crowns and boles (at least 25" dbh) in the overstory, and a well-developed midstory and understory are essential to best meet the habitat requirements of the priority neotropical migratory birds and other wildlife.

Later in the forest maturation cycle, silvicultural treatments generally prescribed will be group selection harvests and shelterwood or seed tree cuts to regenerate primarily shade intolerant species. Individual tree selection is generally utilized for regeneration of shade-tolerant species.

As noted above, the FHMP for Cache River NWR was approved in 2001. Compartments were inventoried according to the FHMP, and forest treatments began in 2003 and continued through 2004. Additional treatments were approved and contracted up until the April 2005 public release of the IBWO rediscovery. The rediscovery led to a moratorium on forest product harvesting, and existing contracts were rescinded. The FHMP was amended to address the needs of the IBWO, revamp the inventory cycle, and improve the distribution of treatments in February 2006.

The *Central Arkansas Refuges Forest Habitat Management Plan Addendum* addressed habitat management implications in recognition of strong evidence for presence of the endangered IBWO. It noted that the stomach contents of IBWO included animal matter, but also 54 percent was vegetable

matter, mostly soft mast. This indicates IBWO needs some amount of decadence in the forest for insect production, but also areas productive in mast. Mast production (both hard and soft) is abundant where sunlight is available, thus creating and maintaining canopy gaps fulfill a vital role in properly managing IBWO habitat.

Forest treatments resumed at Cache River NWR in August 2006, with continuation of a pre-IBWO approved removal of non-native loblolly pine and subsequent conversion to hardwoods. While there were other hardwood treatments approved prior to the IBWO re-discovery, management sought to slowly reinstate forest treatments on the refuge by beginning in an area that was judged by many to be unsuitable IBWO habitat. The refuge completed all necessary steps to ensure compliance with Service, NEPA, and endangered species regulations. Hardwood forest improvement treatments will now resume in areas that have been thoroughly surveyed for evidence of the IBWO.

Desired Future Forest Conditions have been further refined by the 2007 Final Report of the Forest Resource Conservation Working Group formed under the LMVJV, entitled *Restoration, Management, and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife Habitat*. The report uses indicators of habitat structure for determining Desired Forest Conditions.

Strategies:

- Continue periodic forest evaluations and treatments as prescribed in the current FHMP.
- Develop and implement Annual Habitat Work Plans following the FHMP evaluation/treatment cycle to facilitate management actions focused on:
  - improving forest habitat and structure,
  - stimulating developed lower vegetation layers, and
  - regenerating shade intolerant species for the benefit of priority bird species.
- Apply silvicultural treatments to achieve the desired forest conditions of the FHMP and Addendum considering the overall needs of the refuge ecosystem, individual site characteristics, habitat conditions, geomorphology, degree of past disturbance, and hydrology.
- Conduct post-treatment monitoring to ensure that objectives are met and to increase efficiencies in obtaining desired results through adaptive management.
- Maintain the CFI system on a 10-year-cycle and develop effective methods to streamline data collection, conduct practical measurements, and analyze and track refuge habitat and site conditions over time.
- Note unique habitats such as cane, corkwood, and pondberry as encountered in CFI surveys for reference in future botanical surveys.
- Continue to restore and develop new forestlands by:
  - Restoring and planting newly acquired croplands identified for restoration within two years of acquisition;
  - Giving priority to establishing connectivity between larger forest blocks and expanding the size of existing blocks;
  - Considering individual site geomorphology, historic and desired future conditions, degree of past disturbance in regard to site alteration, and hydrology to make decisions concerning appropriate species to be planted, methods of planting, and the timing, frequency, extent, depth, and duration of hydroperiods to be restored;
  - Continuing active dialog with carbon companies, USDA, and other partners to establish adequate species diversity and stocking rates for reforestation and successful restoration;

    - Promoting appropriate areas of self-sustaining scrub-shrub habitats such as plum, deciduous holly, sumac, and other native shrubs in reforested blocks;
    - Evaluating reforestation sites through the FHMP evaluation/treatment cycle;
    - Cooperating with other refuges, AGFC, and NRCS to develop the best strategies to transition late stage plantations into the existing forest block by developing techniques to enhance vertical structure, species composition, and functions of a mature forest in these late stage plantations.
- Monitor greentree reservoirs for impacts of seasonal flooding and long-term forest health to facilitate adaptive management.
- Maintain shrubs along select, low-priority roads, ditches, and levees to discourage cowbird use and encourage use of this habitat by other resident wildlife for cover and forage.
- Provide a recurring supply of short-term scrub-shrub habitat to support the needs of refuge wildlife that are dependent on such habitat.
- Encourage cane in existing forest by thinning the overstory to allow increased penetration of sunlight to the forest floor.
- Identify areas suitable for cane restoration by considering geomorphology, hydrology, and soil characteristics.
- Identify appropriate upland sites for restoration of scrub-shrub, oak savannah, and grassland communities by considering site geomorphology, degree of site alteration, and hydrology.
- Develop and implement various techniques, such as mowing and prescribed burning, to restore and maintain appropriate upland sites as scrub-shrub, oak savannah, and grassland communities.
- Continue protecting refuge habitats through wildfire suppression by relying on local fire departments, Arkansas Forestry Commission, and properly trained refuge staff. Maintain firebreaks in young hardwood plantations throughout the grassy understory stage.
- Prepare and implement an updated Fire Management Plan that includes use of prescribed fire as a habitat management tool.
- Administer the forest management program in compliance with 50 CFR 29.1.

Cache River NWR Objective 2-3: Cropland Habitat Management

Continue farming 3,100 acres through a Cooperative Farming Agreement and supplement this acreage as needed to fulfill refuge purposes and meet current foraging objectives identified in the step-down plans of the NAWMP.

Discussion: Cropland management is crucial to the refuge's ability to meet its waterfowl foraging habitat objectives because it provides a concentration of high-energy foods within a relatively small area compared to a forest setting. Cache River NWR manages cropland habitats in addition to moist-soil units and bottomland hardwood forests to provide the best array of waterfowl foods possible. During the time period waterfowl are wintering in Arkansas, unharvested crops are typically not available on private lands, unless they are maintained for hunting purposes. Providing unharvested crops in a sanctuary setting allows wintering waterfowl to benefit from this high-energy food service with a minimum of caloric expenditure involved in foraging and avoiding disturbance.

Cache River NWR has utilized agricultural practices as a means of waterfowl management since its establishment in 1986. The refuge utilizes cooperative agreements with a local farmer. The refuge has two farm units, totaling 3,100 acres. The Dixie Farm Unit, which lies in Woodruff County, contains approximately 2,363 acres of cropland. The Plunkett Farm Unit, which lies in Prairie County, contains approximately 742 acres of cropland. The cooperative farmer is required

to adhere to all refuge regulations and provide all necessary documentation, while conducting approved agricultural practices on the refuge.

Crops grown on the refuge include rice, milo, soybeans, corn, and Japanese millet. A joint decision between the refuge and the cooperative farmer is made to determine crop type and planting locations for the refuge's crop share. Consequently, the refuge must identify specific fields and acreages of crops to be shared with the farmer and delineate these fields on maps, in tables, and on the ground as part of each cooperative farm agreement. Cooperative farmers may grow any of the above crops as their share.

Soil erosion is not a problem on any refuge cropland. Most cropland is fairly level with minimal ridge and swale areas. The few areas classified as highly erodible by the NRCS are transitional slopes between first and second bottoms or upland terraces. These areas have been planted back to trees or allowed to revegetate naturally.

The refuge has rehabilitated, replaced, or constructed new water control structures and levees on impoundments in the farm fields, but additional impoundment work is needed to provide improved wildlife habitat. The main factors limiting improvement in cropland and moist-soil management capabilities are the lack of resources.

The original LMVJV cropland habitat objective for Cache River NWR was to provide 1,360 acres of unharvested crops as forage for wintering migratory waterfowl (Table 10). In order to achieve this ambitious target, approximately 5,440 acres would need to be actively farmed, based on the 75/25 share agreement. With the current acreage available for cropland management, the refuge is unable to meet this unharvested cropland objective. However, the potential exists to expand on available waterfowl foraging habitats, including cropland, as additional private tracts are added through refuge acquisitions.

If additional DEDs are required or refuge objectives are not being achieved in Arkansas on public lands, then recently purchased tracts of $\leq$ 2,000 acres on Cache River NWR, such as a parcel that has water management infrastructure, potentially could be farmed to significantly boost DEDs with minimal effort to meet refuge DED objectives. Cooperative farming would be used to create such habitat with virtually no resources required from the Service, except for oversight. This new area potentially could be comprised of a mixture of sanctuary and hunting areas, such as the Dixie Farm Unit.

Current potential exists to create impoundments and flood typically dry agriculture fields on the western end of the Dixie Farm Unit for waterfowl, shorebirds, and wading birds. A topographic survey of these areas would be conducted and an engineer would need to draw the plans for water control structure and levee placement to create impoundments. An application could be made for a North American Wetlands Conservation Act (NAWCA) grant to complete engineering and construction activities. Partners, such as Ducks Unlimited, could assist in the engineering and construction work.

Similarly, there is a great need to create several shallow-water impoundments for moist-soil or cropland management on the Plunkett Farm Unit. Currently, there is only one water control structure, well, and impoundment on this unit, which limits control of water supply, delivery, and depth for waterfowl habitat management activities. Water depth may range from 6 feet at the control structure down to only mudflats at the upper end. This severely limits options to propagate waterfowl habitat during the growing season and create shallow water habitat during the fall and winter migration. Several impoundments could be created on this 700-acre unit to enhance waterfowl management.

Strategies:

- Provide 150 acres of unharvested rice, 500 acres of floodable unharvested milo, and 80 acres of floodable moist-soil habitat on the Dixie Farm Unit to achieve DED foraging objectives.
- Flood all unharvested crops and approximately 75 percent of the harvested crops within farming units for foraging habitat for waterfowl, shorebirds, and other water birds.
- Increase the acreage of harvested floodable crops on the Dixie and Plunkett Farm Units by adding levees and water control structures as feasible.
- Continue to prohibit fall disking by the cooperative farmer in order to retain waste grain for waterfowl, and promote availability of earthworms for woodcock.
- Maintain vegetation buffer strips around fields to reduce herbicide and fertilization drift and runoff.
- Minimize soil erosion by:
  - Not allowing any fall disking;
  - Retaining rice levees over winter;
  - Using water control structures to hold a winter flood on cropland acreage;
  - Requiring a cover crop as opposed to clean tillage of any set-a-side acreage;
  - Using vegetated buffer strips adjacent to rivers, bayous, and drainage ditches.
- Consider farming suitable new acquisitions, if feasible, to achieve refuge DED objectives.
- Administer the cooperative farming program in compliance with 50 CFR 29.1.

Cache River NWR Objective 2-4: Water Management

Using low-maintenance, natural processes where possible, restore, enhance, or maintain hydrologic regimes of the refuge to assist in improving farm, moist-soil, and other wetland management units that provide important resources for wetland-dependent species.

Discussion: Cache River NWR contains extensive lands along the Cache River corridor and includes a diversity of geomorphic, soil, topography, and hydrological conditions. Generally, management of the refuge should be directed to protecting, maintaining, and restoring the natural physical features, ecological processes, hydrological regimes, and vegetation communities endemic to the region. If this conservation can occur, management can assist restoration and provide key functions, values, and resources to plant and animal communities, especially certain species of concern and refuge establishment priority.

The long-term sustainability of bottomland hardwood communities on the refuge depends on the protection, enhancement, and restoration of natural channel and floodplain water flow patterns and regimes. This includes: (1) Physical flow patterns (both flooding and drainage); (2) timing, depth, and duration of river discharges and overbank flooding; and (3) water quality and sediment loading in the Cache River and its drainages.

A primary objective for Cache River NWR should be continued attempts to obtain, via fee-acquisition, lands within the approved refuge expansion boundary, especially lands that connect existing bottomland hardwood patches, reduce hydrological impacts from surrounding private lands, and offer opportunities for reforestation and restoration of natural flow and flooding patterns.

Many past, present, and future changes occur (or are proposed to occur) in topography, drainage, land use, and vegetation communities along the Cache River. Past and present alterations should be monitored and evaluated and proposed changes should be carefully evaluated to determine how, or

if, restoration to more natural hydrology can be achieved. For example, low-water crossings should be used instead of culverts at road crossings where feasible to allow natural flows and reduce beaver impoundment problems.

A primary aim for the refuge should be to provide for, and encourage, natural patterns of overbank flooding and drainage along naturally occurring flow paths, such as sloughs, side channels, swales, and meander valley networks. Water control structures should be constructed and maintained only in sites and units where intensive management is desired and possible, such as areas with moist-soil or greentree reservoir impoundments.

Water management plans are needed for all land units, and fields/areas within each unit. These plans should promote, if possible, the vegetation community that naturally occurred in that site relative to geomorphology, soils, topography, and hydrology. Each existing water control structure should be evaluated and monitored to determine its functions and capabilities relative to management objectives. Many water control structures should be replaced, or eliminated where possible, to either intensify moist-soil management or, where desired, restore a non-manipulated water regime.

Strategies:

- Develop, enhance, or maintain water control to properly manage wetland habitats.
- Restore more natural flow and hydrological regimes in the Cache River channel and its floodplains where feasible.
- Develop and maintain water control infrastructure to assist restoration of bottomland hardwood floodplain communities and intensively manage moist-soil impoundments, agricultural fields, greentree reservoirs, and other wetland units.
- Develop a detailed water management plan for each unit of the refuge that includes purposeful water management and provision for natural overbank flooding and subsequent drainage.
- Evaluate influences of off-refuge physical and hydrological developments to hydrology on the refuge.
- In coordination with Service partners, inventory and evaluate all lands within the Cache River floodplain corridor as to: (1) Past and current habitat types; (2) past and current hydrological condition; (3) water management practices; (4) influences of flow pattern and duration on refuge lands; (5) land uses and potential contributions of sediment and contaminants; and (6) ownership issues.
- Study and carefully monitor larger, system-wide issues such as: (1) Proposed clearing of blockages; (2) diversion of river water for agriculture or other uses; (3) channelization versus restoration of formerly channeled areas; and (4) changes occurring from wetland restoration (e.g., WRP) or management (e.g., lands identified for IBWO management).
- In developing strategic plans for Cache River NWR, incorporate more holistic hydrogeomorphic analyses of community structures, functions, and values within the context of the entire White River Basin of Arkansas and Missouri.
- Recruit a hydrologist to be based at Big Lake NWR to: coordinate hydrological and water quality issues on all refuges within the Complex, coordinate hydrological research and monitoring, provide technical advice to adjacent landowners, provide liaison function with COE, and coordinate aquatic restoration projects.

Cache River NWR Objective 2-5: Habitat Investigating, Inventorying, and Monitoring

Improve and expand investigating, inventorying, and monitoring of the refuge's flora and habitats and prepare and implement an Inventorying and Monitoring Plan (IMP).

Discussion: The Improvement Act formally establishes the necessity of monitoring the status and trends of fish, wildlife, and plants on national wildlife refuges. Service policy is to collect baseline information on key plants, fish, and wildlife to monitor, as resources permit, critical parameters and trends of selected species and species groups on and around Service units, and to base management on biologically and statistically sound data derived from such inventorying and monitoring (701 FW 2, Inventorying and Monitoring of Populations).

Monitoring, inventorying, and surveying (MIS) are very important means for scientifically managing trust wildlife populations and habitats, as well as meeting national, regional, and refuge goals. Before any MIS is started, the surveyor should seriously and honestly determine if: (1) Objectives, which are clear, specific, and measurable, are defined and can be practically met; (2) the results will actually be used to benefit the resource or make informed decisions; (3) quality and quantity of data needed to meet the objectives can be collected; (4) the MIS methodology is scientifically and statistically sound; (5) the costs of conducting the MIS are worth the results; (6) resources are available or will become available to complete the MIS; (7) the method of data analysis is pre-determined; and (8) MIS is prioritized so if resources become limited then more critical MIS will be conducted.

Adaptive management is a system used by refuge managers to improve results by documenting management actions, measuring and documenting biological responses, and adapting (modifying) management actions to improve desired conditions/outcomes and determine if objectives have been met. Baseline inventorying and monitoring at regular intervals provide data essential for informed decision-making by refuge managers. Appropriate inventorying and pre- and post-treatment monitoring of refuge habitats are fundamental for adaptive management. Inventorying and monitoring needs can often be met with the assistance of other Service programs and cooperative efforts with State resource agencies, universities, and USGS. Proper attention must be given to experimental and monitoring design, statistical procedure, and consistency in observation and data collection.

Management of moist-soil sites in particular requires intensive monitoring throughout critical establishment and manipulation periods to determine whether growth and availability of waterfowl or shorebird foods are sufficient to meet habitat goals. While water gauges in each impoundment allow detailed records on water levels, data on soil moisture, plant germination, and composition also will be required to successfully manage moist-soil areas.

Strategies:

- Increase capability to conduct habitat investigating, inventorying, and monitoring by recruiting a biological technician for Cache River NWR and an ecologist, hydrologist, assistant forester, and forestry technician for the Complex
- Collect and assess inventorying and monitoring data that are relevant to and contribute to decision-making regarding refuge habitat management (adaptive management).
- Continue to coordinate with partners, universities, USGS, and others to conduct monitoring and inventorying of habitat resources on the refuge.

- Implement inventorying and monitoring efforts for refuge habitat resources including moist-soil units, CFI, botanical surveys, vegetation responses to management activities, invasive plant infestations, hard mast production, success of afforestation and reforestation activities, cropland habitat production, and plant species composition of grassland, scrub-shrub, and early successional habitats.
- Maintain habitat inventory and survey data in databases that enable efficient data storage and retrieval.
- Strive to develop data sets that are statistically robust so that analysis of monitoring results can be more useful in determining adaptive management responses.
- Record survey activity and results in annual narratives or annual habitat and survey plans.
- When time, personnel, or expertise are lacking, recruit volunteers such as interns, retirees, and/or skilled volunteers from universities or conservation clubs (e.g., Arkansas Audubon) to assist with habitat inventorying and monitoring.
- If possible, provide suitable housing for volunteers and interns as a means to effectively recruit the best candidates.
- Continue to enhance refuge inventorying and mapping capabilities through the use of databases, such as Geographic Information Systems (GIS); use capabilities shared with other Service offices (e.g., Realty, LMVJV), whenever practical.
- Continue to develop GIS data layers depicting occurrence/abundance of plant and animal species (e.g., roost sites, vegetation cover maps) and management activities (e.g., forest management compartments, water management units).
- Coordinate with AGFC, USGS, COE, NRCS, and other organizations to design and conduct research that will provide refuge managers with information needed to improve habitat management programs to better fulfill refuge purposes.

RESOURCE PROTECTION

Cache River NWR Goal 3: Promote communication, cooperation, and partnerships between local, state, and federal agencies, land managers, and private citizens to minimize impacts from off-site environmental degradation and other threats to the functions and values of the refuge's associated wetland ecosystems and watersheds.

Discussion: In order to achieve its purposes and vision, Cache River NWR must address a number of issues that threaten to degrade or diminish the value of its resources. These threats include invasive plant and animal species, water quality and contaminant issues, development, and illegal activities.

Cache River NWR Objective 3-1: Invasive Plant and Nuisance Animal Control

Identify and control/eradicate invasive, exotic, or nuisance plants and animals. Develop a database to systematically track occurrences and treatments through the FHMP evaluation/treatment cycle.

Discussion: Invasive plant species threaten refuge flora and fauna. Widespread problems include European or Chinese privet and Japanese honeysuckle along forest edges and in reforestation sites and some harvested stands; mimosa, chinaberry, and non-native pine occasionally found in restored fields; and American Lotus, although native, can present an invasive problem in refuge impoundments. Kudzu currently affects over 100 acres of refuge habitat at four separate locations. The kudzu-infected sites will require several years of treatment; however, all of the kudzu areas received initial treatment with Transline (an herbicide specific to legumes) in 2006. Additional treatments occurred in late fall 2007 and summer 2008. Control of privet and honeysuckle has not yet been implemented, but will be implemented during late fall and continue on a yearly basis.

Mimosa, chinaberry, and pine have been controlled during the normal course of operations through on-the-spot eradication, using herbicides.

Although beavers are a native species, their damming activity and resulting impoundments can interfere with intended habitat management on the refuge. Historically, beaver impoundments served the function of providing wetland habitat utilized by a variety of fauna. However, the surrounding watershed has changed - it is now mostly agriculture instead of forest. Beaver impoundments have compounded the problem of altered hydrology, particularly related to increased agricultural run off in the form of continual irrigation drainage during the growing season. Considerable staff time and funds are devoted to removing impoundments and controlling beaver populations.

Currently, trapping is prohibited on the refuge, but management should have the option of implementing a nuisance animal or furbearer management trapping program if necessary in the future. Nuisance animal removal should target beaver, nutria, and muskrat that negatively impact habitat, as well as predators such as raccoons, skunks, coyotes, or bobcats, that reduce target animal populations. Similarly, night hunting of some species may be biologically sound and necessary and therefore should never be regarded as unconditionally prohibited. These options and others for predator, parasite, or disease control should be incorporated into management plans as needed for biological and human safety concerns.

Strategies:

- Implement invasive species prevention and control programs in compliance with 50 CFR 29.1 and EO 13112.
- Supplement the invasive plant database with occurrences found during the course of normal activities. Eradicate small invasive plant infestations on the spot.
- When large invasive plant infestations are encountered, develop plans for coordinated control efforts.
- Document treatment efforts and track success to enable adaptive management.
- Document beaver dam occurrences in a database developed during the course of the normal FHMP evaluation cycle.
- Develop a database that tracks locations of problem areas, impoundment characteristics, and beaver control efforts.
- Continue to control beaver populations through shooting, trapping, and removal of impoundments.
- Continue to pursue grants to fund prevention/control activities.
- Consider allowing commercial trapping through special use permit to control exotic, invasives, or nuisance wildlife to protect refuge infrastructure, refuge habitats, and priority wildlife species.

Cache River NWR Objective 3-2: Water Quality

Establish and implement management actions to protect and improve water quality of aquatic resources on the refuge and the fish and wildlife resources that they support.

Discussion: A minor source of turbidity and siltation of watercourses on the refuge originate from land use (particularly farming and road/levee construction) on the refuge itself, while a greater share of the overall problem is erosion and runoff (e.g., non-point sources) outside refuge boundaries.

Strategies:

- Identify, assess, and treat areas prone to erosion prior to the development of sedimentation problems, especially on recent acquisitions of prior-converted farmlands.
- Avoid increased sediment transport by following BMPs in all refuge actions, such as farming, moist-soil management, construction, and road maintenance, whether performed by a contractor or by the refuge.
- Be alert to upstream activities causing problems in refuge waters (e.g., natural gas production), and develop a monitoring system to document potential water quality problems, including sampling factors such as water and sediments, fish tissues, and rapid bio-assessment techniques.
- Where and when possible, allow natural stream flow processes and stream course changes to occur; if bank stabilization is necessary, employ bioengineering techniques where feasible.
- Within the context of the refuge's reforestation plans, plant the appropriate species for hydrologic conditions, such as flood-tolerant shrub and tree species [e.g., common buttonbush (*Cephalanthus occidentalis*), black willow (*Salix nigra*), red maple (*Acer rubrum*), and baldcypress (*Taxodium distichum*)], in the riparian corridor of prior-converted farmlands and other areas prone to erosion to aid in soil stabilization.
- Develop beaver population objectives on refuge lands and, as appropriate within the context of the refuge's reforestation and forest management plans, manage beaver dams to contribute to refuge water quality goals and objectives.
- Document the location of all culverts and water control structures on the refuge, especially those repeatedly dammed by beavers. Where the structures are not necessary, replace them with rock-lined low-water crossings to maintain vehicular access, discourage dam construction by beavers, and reduce blockage of structures by debris, thus facilitating drainage.
- Work with the Service's private lands biologists, AGFC, ANRC, ADEQ, and NRCS to develop incentives for local farmers and landowners to encourage the use of filter strips to reduce agricultural runoff.
- Work with NRCS, state partners, and Service Private Lands Program biologists to establish acreage objectives for riparian zone buffers along Cache River, Bayou DeView and tributaries upstream of the refuge.
- Establish vegetated streamside filter strips within 100 yards of the Cache River, Bayou DeView, and other tributaries, and encourage other landowners to do the same.
- Recruit a hydrologist based at Big Lake NWR to coordinate hydrological and water quality issues on all refuges within the Complex, coordinate hydrological research and monitoring, provide technical advice to adjacent landowners, serve as a liaison with COE, and coordinate aquatic restoration projects.

Cache River NWR Objective 3-3: Contaminants

Determine if any contaminants exist on Cache River NWR, what their impacts to the refuge are, and how to mitigate these impacts.

Discussion: Level I Contaminants Surveys are conducted for each tract of land prior to acquisition. Level II surveys have been conducted for a couple of tracts that had previous petroleum products or pesticide mixing activities on-site. Level I or higher level contaminants surveys will be conducted for future acquisitions as the situation demands.

A study of potential chemical contaminant exposure and the biological effects of this exposure at 26 national wildlife refuges in the LMRE was conducted between 1995 and 2000 (Shea et al., 2001). Water, sediment, fish, and passive sampling devices were used to acquire toxicity data to characterize chemical exposure. The study also assessed the potential biological effects of this exposure. The primary focus of the study was on organochlorine pesticides, currently used pesticides, and mercury. Additional analyses were conducted for polychlorinated biphenyls and polycyclic aromatic hydrocarbons.

Organochlorine pesticides like DDT and toxaphene were widely used for many years but were banned many years ago in the United States due to their persistence and tendency to bioaccumulate and biomagnify to levels that caused documented impacts on fish-eating raptors, such as Bald Eagles, Ospreys, and Brown Pelicans. Organochlorine pesticides were detected in predator and benthic fish at 24 refuges, including Cache River NWR. The mean concentration of DDT detected at Cache River NWR exceeded 150 ng/g (parts per billion), a level more protective than the 1,000 ng/g predator protection level. Mean toxaphene levels at Cache River NWR were below historical levels in predator fish and near the historical level in benthic fish; however, the mean for both were below the lowest biological effects value of 400 ng/g. Total DDT in sediment for Cache River NWR was less than the probable effect concentration. Toxaphene in sediment was higher at Cache River NWR than at Bald Knob NWR. Where historical data were available, both DDT and toxaphene were generally below historic levels. Total DDT in water on Cache River was below the 1 ng/L, but at least one sample equaled the Environmental Protection Agency's Water Quality Criteria for protection of aquatic life. All toxaphene levels were below the EPA aquatic life protection level.

At least two of the 50 current use pesticides measured – trifluralin and azinphos methyl – were detected at the refuge. In addition, 2, 4-D, bentazon, metolachlor, trifluralin, acifluorfen and 3,4-dichloroaniline also were detected. Eight pesticides, including azinphos-methyl, tetribuzin, and trifluralin, collected near the refuge, exceeded aquatic life criteria. Concentrations of PCBs in fish, water, and sediment were below known threshold levels for biological effects and water quality guidelines. Mercury was detected in fish on the refuge, but concentrations were below thresholds for fish-eating mammals, and below levels which would cause concern over human health. No fish consumption advisories for mercury or other contamination have been issued for water bodies on or flowing through Cache River NWR.

In conclusion, potential hazards for PCBs, polycyclic aromatic hydrocarbons, and mercury were unlikely at Cache River NWR, but hazard potential was uncertain for organochlorine pesticides and current use pesticides.

Strategies:

- Establish and implement contaminant protocols to monitor and evaluate contaminant issues that could affect the refuge and the fish and wildlife resources that it supports.
- Coordinate with personnel at the Service's Arkansas Ecological Services Field Office, ADEQ, and USGS to establish and maintain a contaminants and water quality monitoring program on the refuge.
- Sample water, sediments, and fish in oxbow lakes to assess contaminants and water quality.
- Coordinate with Arkansas agencies, USGS, and other partners to conduct surveys every 5 years or as appropriate to document status and trends of refuge aquatic resources and physical water quality parameters, including contaminants.

Cache River NWR Objective 3-4: Land Acquisition

Acquire lands from willing sellers within or adjacent to the approved acquisition boundary of the refuge to enhance conservation programs, achieve legislated purposes of the refuge, and fulfill the mission of the Refuge System.

Discussion: In the Cache River watershed, the natural system has been vastly altered from historic conditions. The greatest impediment to natural ecosystem function is the current hydrology, which has been modified tremendously from historic natural patterns, largely through long-term structural impacts of drainage and flood control. The alteration of natural processes, such as hydrological systems, results in lands and waters that are not sustained in the manner in which they evolved and thus are subject to ecological stressors to which they are not adapted. Conserving lands through refuge acquisition positively affects the integrity of the landscape, thus protecting and insulating existing refuge habitats from the impacts of ecological degradation.

Land acquisition is an important component of increasing net benefit to wildlife and fisheries directly through conserving, restoring, and managing additional acres of habitat, but also in increasing the elasticity or resilience of the system in absorbing the impacts of the altered environmental system of the 21st century. Strategic acquisition of lands can lead to increases in contiguous habitat block size, corridors, and availability of limited habitat types, resulting in increases in both the quantity and quality of wildlife habitat.

The current acquisition boundary is defined by the historical 10-year floodplain of the Cache River. However, the public voiced concern during the scoping process for this Draft CCP/EA that other important habitats are not eligible for acquisition by the refuge for associated conservation, restoration, and management. Less than a 10 percent expansion (minor boundary expansion) can be accomplished in the Regional Office, while a major boundary expansion (more than 10 percent of the existing area) must be approved by the Service's Washington, D.C., Office. The Biological Review Team also recognized the value of expanding the acquisition boundary to enhance conservation efforts.

Currently, 5 parcels comprising 703 acres in Monroe, Prairie, and Woodruff Counties are in refuge ownership, but are situated outside the current approved acquisition boundary. These tracts need to be exchanged for lands inside the acquisition boundary for Cache River NWR. Additionally, 8 tracts totaling 1,606 acres in Arkansas and Desha Counties were purchased as a result of the Potlatch exchange agreement, using funds allocated for Cache River NWR. These tracts are located outside of the currently approved Cache River NWR acquisition boundary. These outlying tracts are administered by White River NWR, because they are located to the south of that refuge. These lands also need to be part of a land exchange agreement for Cache or White River NWRs, or as part of a multi-refuge exchange.

Strategies:

- Enable conservation, restoration, and management of additional wildlife and fisheries habitats through actively pursuing acquisition of lands from willing sellers; wetlands and other waterfowl habitats should remain the highest priority for acquisition.
- Emphasize in outreach efforts that acquisition will occur only inside or within 1 mile of the approved acquisition boundary and only from willing sellers.
- Work cooperatively with White River NWR, the Service's Division of Realty, and AGFC and other partners to exchange currently owned parcels outside the approved acquisition boundary for parcels within the approved boundary.

- Over the long term (i.e., the 15-year span of this CCP and beyond), consider expansion of the refuge acquisition boundary in response to the need for additional conservation of important wildlife habitats by considering:
  - Creating a wildlife corridor from the Cache River to Bayou DeView at Howell, which would not only connect these two forest blocks, but would also secure a range of diverse habitats (upland to bottomland) and provide secure habitat for wildlife escaping winter flooding; several properties that would help achieve this purpose are available from willing sellers;
  - Extending the acquisition boundary from Amagon to Grubbs or possibly north of Grubbs;
  - Broadening the acquisition boundary to conserve unprotected lands along the White River, particularly adjacent to Wattensaw WMA and South of I-40;
  - Purchasing escarpment property that would serve as escape cover for resident and migratory wildlife at every opportunity (with or without a change in the acquisition boundary).

Cache River NWR Objective 3-5: Private Lands

Expand efforts to coordinate with private landowners and partner agencies to manage croplands and restore native wetlands in the watershed to help achieve refuge wildlife objectives and the objectives of various national and regional wildlife plans for the LMV.

Discussion: The USDA Farm Service Agency (FSA) approved the Cache River/Bayou DeView Conservation Reserve Enhancement Program (CREP) project in 2007. The proposal for this project was developed by a multi-agency/organization, the Ivory-billed Woodpecker CREP Committee, in 2005. The Cache River/Bayou DeView CREP established a 161,144-acre project area in Monroe, Prairie, and Woodruff Counties, encompassing the area in which the IBWO was rediscovered in 2004. The majority of the project area consists of agricultural land, while the remainder is covered by bottomland hardwood forests in federal, state, or private ownership. The entire project area is in close proximity to Cache River NWR.

The objective of the Cache River/Bayou DeView CREP is to restore bottomland hardwood forested wetlands, which the IBWO requires for breeding, foraging, and survival. The determination of the location for this CREP was based on evidence of the IBWO presence, as well as a biologically based decision support model for reforestation for forest breeding birds. In 2002, LMVJV biologists developed the GIS-based Forest Breeding Bird Decision Support Model (FBBDSM) for use as a planning tool to guide reforestation efforts in the MAV, by optimally positioning reforestation to increase forest “core” (defined as forest greater than 0.62 mile from a “hostile” edge) habitat based on forest bird biology.

The FBBDSM seeks to improve fragmented landscapes and increase population nesting success for forest-wetland-dependent songbirds of greatest conservation concern in the MAV by: (1) Spatially prioritizing forest restoration to reduce forest fragmentation; (2) increasing the number and area of forest patches that harbor more than 5,000 acres of forest core and those with forest cores greater than 12,500 acres; (3) emphasizing areas with little extant forest, targeting restoration within local (10 km or 6.2 miles) landscape contexts to achieve at least 60 percent or more forest cover; and (4) emphasizing high site (well-drained) bottomland hardwoods within higher priority areas due to their value for ground and shrub-nesting forest breeding birds. The project area chosen for this CREP contains a significant amount of agricultural land, which falls within the top 10 percent priority for reforestation, according to the FBBDSM.

Land eligible for enrollment under Conservation Reserve Program (CRP) requirements will be restored to forested wetlands through any of four allowed CRP practices. Enrollees will enter into 10- or 15-year CRP contracts with the FSA. However, unlike other CRPs in the United States, this CREP requires permanent conservation easements to be placed on each tract of land enrolled. The Nature Conservancy of Arkansas will fund the easements, and the AGFC will manage and monitor the easements. Enrollees will receive annual soil rental payments substantially higher than received under regular CRP, as well as a one-time payment for the easement.

The 15-year projected cost of this CREP, including federal and non-federal funding, totals $11,618,538 ($9,236,813 federal; $2,381,725 non-federal), sufficient to enroll and restore approximately 6,250 acres.

Within the immediate vicinity (5 miles) of Cache River NWR, NRCS has purchased 30-year or permanent WRP easements on approximately 12,650 acres along the Cache River in three counties; 5,275 acres along Bayou DeView in two counties; and 17,150 acres along the White River in three counties. Most of these easements have been restored to a mix of bottomland hardwood forests and seasonally flooded herbaceous wetlands. WRP has helped de-fragment and enlarge contiguous forest blocks essential to forest breeding birds, including the IBWO and numerous species of neotropical migratory birds whose populations are declining. A change in the 2008 Farm Bill requires that land must be in the same ownership for 7 years before a parcel can be eligible for enrollment in WRP. Thus the number of properties eligible for WRP will be reduced along with the resultant benefits to wildlife habitat afforded by WRP.

The Service's Partners for Fish and Wildlife Program provides assistance to private landowners for habitat restoration projects and complements the USDA conservation programs (e.g., WRP). This program could be instrumental in restoration of forest lands adjacent to the refuge. It can provide funding to landowners who otherwise may not qualify for USDA funding. Refuge staff will work closely with the Service's private lands biologists to promote restoration of these lands.

AGFC's private lands biologists help deliver various conservation programs. They have contacts with private landowners and help them identify areas eligible for conservation programs, fill out program applications, plan, and construct projects. Refuge staff will work with the AGFC personnel to help identify and restore adjacent tracts.

Strategies:

- Consult with LMVJV biologists to refine the FBBDSM for use in habitat restoration in this portion of the MAV.
- Cooperate with NRCS staff in implementing the CREP.
- Ensure close communication and collaboration between the refuge and the Service's and AGFC's private lands biologists to promote assistance to private landowners in the area who have habitat restoration projects in the vicinity of the refuge.

Cache River NWR Objective 3-6: External Threats

Promote communication, cooperation, and partnerships between other agencies, land managers, and private citizens to minimize impacts from external threats to the functions and values of the refuge's wetland ecosystems.

Discussion: The habitats and wildlife of Cache River NWR are threatened by a number of off-refuge actions and trends, among them the following:

- Oil and gas drilling and development that involves potential pollution and excessive water usage associated with drilling in nearby shale formations
- Pipelines
- Navigation on the White River
- Flood control on Cache River
- Irrigation – small scale adjacent landowners pumping (dewatering) and then potentially flooding the refuge during dewatering
- Grubbs blockage and potential remedies
- Habitat modification on private land adjacent to the refuge
- Closure of county roads, waterways, and access
- Minimum stream flow establishment
- Sedimentation
- Invasive plant and animal species

The refuge needs to stay abreast of potential public and private projects, make recommendations, and take action to minimize their negative impacts on refuge resources. There is a critical need to establish minimum stream flow for Cache River and Bayou DeView. Public projects in the Cache and White River watersheds have the potential to drastically impact the ecological conditions of Cache River NWR. The Cache River NWR staff should participate in the project planning and permitting process at every opportunity on projects within the Cache River watershed, as these projects are very likely to affect system processes such as hydrologic function, and thereby the vegetative communities and wildlife populations of the refuge. Staff should evaluate future proposed projects to assess their implications for the refuge.

Current projects that merit awareness and engagement by refuge staff include:

- The Cache River Basin Flood Damage Reduction Project at Grubbs: The COE is conducting a study aimed at reducing flooding in the vicinity of the town of Grubbs in Jackson County. Potential negative impacts include modification to the natural river channel, release of large amounts of sediment and debris downstream, and possible reformation of a blockage downstream on the refuge.

- The White River Navigation Project: This project would enlarge the navigation channel on the White River to provide a 9-foot-deep by 125-foot-wide channel available 95 percent of the time through construction of a series of wing dikes and continued dredging. Implementation of this project could negatively impact the extent of the Cache and White River drainages.

- Restoration of the lower (7 miles) Cache River: This project would restore meanders to the previously channelized lower portion of the Cache River. Sponsored by Ducks Unlimited (DU) and AGFC, it is under study by the COE. It would benefit aquatic resources, as well as help restore hydrologic function to the landscape and the Cache/White River drainage.

- Continue to provide support and assistance to Ecological Services in review of 404 permit applications, which may potentially affect refuge resources. Provide additional biological insight on the impacts of off-refuge projects, or cumulative effects of such projects, on refuge lands.

- Highway 79 and Jackson County Road 51 Bridge Projects: Cache River NWR staff participated in the planning and design for these projects. The Arkansas Highway Transportation Department designed criteria that will improve hydrology along these roadways and right-of-way stipulations will allow the projects to meet refuge compatibility, safety, and public access needs.

- The Nature Conservancy Big Woods project: This is an initiative by TNC to reforest 500,000 acres of land in the White/Cache River basin through agency partnerships and private landowner incentives. The reforestation of these lands would be of tremendous benefit to the landscape in which the refuge is situated, and would both increase available wildlife habitat as well as enhance existing habitat.

- Bayou DeView, Cache River, and White River Minimum Flows: The ANRC is mandated to set minimum flows for all state streams, but none have been set on the Cache River or Bayou DeView. The unregulated pumping, which therefore occurs, has had negative impacts on these aquatic systems. The concept of minimum flows is that ecosystem health can be maintained provided streamflow does not drop below a biologically based threshold. In reality, there is significant seasonal, annual, and long-term variability in natural system flows which contribute to ecosystem function. It is in the interest of the refuge to support identification and implementation of ecologically sustainable flow parameters. The refuge should continue to work with ANRC to at least designate minimum flow rates on these waterways and preferably adopt ecologically sustainable flows. The ANRC has been working on establishing minimum flows and allocating withdrawal rates on the White River. It is recommended that refuge staff participate in this process, as flows on the White River will directly impact the up-stream Cache River NWR.

- The Grand Prairie Irrigation Project: This project will distribute water diverted from the White River to about 867 farms in the Grand Prairie area for agricultural irrigation. Potential impacts to refuge habitat, fish, and wildlife resources should be monitored.

Strategies:

- Participate in public engineering project planning processes and represent the refuge lands in assessment of potential impacts due to changes in hydrology and stream flows.
- Seek to avoid or mitigate potential negative ecological impacts of pending projects in the planning stages and maintain involvement through implementation and mitigation stages.
- Support the lower Cache River restoration initiative and the cooperative partnership of DU, AGFC, COE, and the Cache River/Bayou DeView Improvement District.
- Continue to stay engaged with AHTD regarding the Highway 79 and Jackson County Road 51 Bridge Projects, and Highway 18 expansion and realignment (Big Lake NWR) and ensure that they are implemented under the agreed-to stipulations.
- Participate in landscape level planning efforts that will directly impact the Cache River NWR lands and regional ecosystem.
- Continue to cooperate and work with other resource agencies and conservation programs to expand the natural habitat base through acquisitions, easements, conservation programs, and planning.
- Provide input and planning assistance in order to influence the effective distribution of conserved lands by emphasizing lands that serve to maximize ecological benefits by expanding blocks of existing habitat and providing corridors between existing blocks of habitat.
- Work with ANRC to establish minimum stream flows for the Cache River and Bayou DeView.

Cache River NWR Objective 3-7: Cultural Resources

Develop and implement a Cultural Resources Management Plan (CRMP).

Discussion: The refuge will protect refuge cultural resources in accordance with federal and state historic preservation legislation and regulations. Several cultural resources surveys and studies have been conducted at specific sites on Cache River NWR. These surveys have documented the presence of two grave sites and several American Indian mounds.

Strategies:

- Prepare a CRMP for the refuge.
- As guided by the CRMP:
  - Conduct a Phase I archaeological survey of the non-flooded areas of the refuge by qualified personnel as a necessary first step in cultural resources management;
  - Conduct a Phase II investigation if archaeological resources are identified during the Phase I survey, to determine the eligibility of identified resources for listing on the National Register of Historic Places prior to any disturbance;
  - Conduct a Phase III data recovery if the resources identified in Phases I and II are determined to be eligible in order to recover data and mitigate the adverse effects of any undertaking;
  - Follow procedures detailed in the CRMP for inadvertent discoveries of human remains;
  - Ensure archaeological and cultural values are described, identified, and taken into consideration prior to implementing undertakings.
- Follow procedures outlined in the CRMP for consultation with the Service's Regional Historic Preservation Office, the State Historic Preservation Office, and potentially interested American Indian tribes.
- Develop a step-down plan for surveying lands to identify archaeological resources and for developing a preservation program.

VISITOR SERVICES

Cache River NWR Goal 4: Develop compatible, wildlife-dependent recreation programs that lead to enjoyable experiences; a greater understanding of fish, wildlife, and habitat conservation; and a greater appreciation for the value of Cache River NWR.

Discussion: Cache River NWR provides each of the wildlife-dependent recreational uses identified as priority public uses of national wildlife refuges in the Improvement Act. These priority uses are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The primary public uses of the refuge are hunting and fishing.

Cache River NWR Objective 4-1: Visitor Services Plan and Public Use Management

Promote and manage appropriate and compatible public uses, and prepare and implement a Visitor Services Plan.

Discussion: The refuge does not have a current Visitor Services Plan. This step-down management plan will provide guidance for management efforts and programs on behalf of public visitation. This plan will improve the ability of staff to provide the visiting public with compatible opportunities to enjoy and appreciate fish, wildlife, plants, and other resources. As a result, the visiting public will develop an understanding and appreciation of each individual's role in the environment, and in particular wildlife conservation, today and into the future.

All existing visitor services activities occurring on the refuge have been evaluated for appropriateness and compatibility. All activities have also been determined to be one of the six priority public uses, to support one of the priority public uses, or otherwise support fulfillment of the purposes of the refuge or the mission of the Refuge System. The refuge is typically open for public use 24 hours a day, 7 days a week. There are no entrance fees. Visitors can gain access to refuge habitats to engage in priority public uses by using 144 miles of gravel roads, 36 boat ramps, and several miles of foot trails. Each year, 6 waterfowl sanctuaries totaling 5,200 acres along the Cache River are closed to all public entry and use from November 15 – February 28. Access to the refuge to conduct priority public uses is allowed by automobile, ATV (hunting only), bicycle, motorized boat, canoe/kayak, and walking. Use of airboats, personal watercraft (e.g., jet skis, hovercraft) and horses/mules are prohibited.

Strategies:

- Monitor, evaluate, and modify as necessary all public uses to minimize conflicts between user groups and ensure compatibility.
- As soon as resources become available, recruit a park ranger (Visitor Services manager) to fully develop and coordinate a comprehensive visitor services program for the refuge and the Complex.
- As soon as funding becomes available, hire a full-time park ranger (law enforcement) to provide adequate visitor and resource protection and assist with outreach efforts.
- Develop a Visitor Services Plan (with public and partner involvement) that addresses the current and future visitor services and recreation needs of refuge visitors, and reflects current legislation, director's orders, initiatives, policy, and the vision of Bald Knob NWR, and the mission of the Refuge System and the Service.
- The plan will specify programs for each type of public use, propose new facilities, address maintenance, upkeep, replacement, and/or elimination of current facilities, and identify a prospective timeline for implementation.
- Continue to expand compatible opportunities for public access when feasible and desirable by providing additional access roads, trails, and boat ramps.
- Continue to maintain and improve, in a compatible and desirable manner, existing access areas to provide for visitor safety, accessibility, and satisfaction.
- Ensure that all compatibility determinations are re-evaluated as necessary.
- Limit ATV access to designated roads or trails only, and allow ATV access only to support hunting.
- Maintain prohibition on camping. In order to reduce conflicts with WMA regulations, better educate refuge Quota Gun Deer hunters, via pertinent information in the refuge hunt brochure and by other means, that they cannot camp on AGFC WMAs.

Cache River NWR Objective 4-2: Visitor Welcome and Orientation

Identify and purchase (if necessary) a site for a visitor center and new headquarters, and implement visitor welcoming and orientation recommendations of the Cache River NWR Visitor Services Review Report.

Discussion: There is a main entrance sign located at the refuge headquarters and directional signs on major roads leading to main refuge access points. Seven kiosks are located and situated to obtain the best visibility. They offer hunting and fishing regulations, as well as a map of the refuge. Regulatory signs mark the seasonal waterfowl sanctuary boundaries. Seasonal "road closed" signs are used to mark flooded trails, as well as the waterfowl sanctuary. An annual hunting brochure with current regulations is available at the kiosks, headquarters, upon request by phone, and on the refuge website. The general leaflet is also available at headquarters, kiosks, upon request by phone, and on the refuge website.

The refuge has a small visitor contact station but no visitor center. The headquarters has one restroom, fully accessible, that is made available to the public during office hours. Visitor hours are posted on the website, on kiosks, and are available at the headquarters. The headquarters is closed on weekends, evenings, and federal holidays. The refuge has a limited staff and no visitor services personnel. Various staff interact with the public and provide customer service. The public can generally reach a refuge employee when telephoning the office.

The current office at Cache River NWR is not suitable for visitor reception or any type of environmental education or interpretive activities. It also is impractical for meetings with partners or the public. This building is not fully accessible. Construction of an environmental education/visitor center is warranted to provide a suitable facility to allow for efficient public use management and administration of a comprehensive visitor services program for the Complex, including opportunities for advanced environmental education and interpretation. An environmental education/visitor center, suituated within easy access to Interstate 40, between the metropolitan areas of Little Rock, Arkansas, and Memphis, Tennessee, would be available for use by literally millions of people annually.

The proposed facility would be approximately 3,500 to 4,500 square feet in size, and would include conference room, auditorium, environmental education classrooms, exhibit and display areas, break room, public restrooms, staff offices, secure law enforcement storage, utility/storage closets, fax/photocopy/file rooms, mudroom, bookstore, friends group and volunteer/receptionist offices. This facility would be fully ADA-compliant and provide adequate opportunities for visitor reception, environmental education, interpretation, and public meetings, and provide necessary administrative function. Greening features would be incorporated to lessen environmental impacts and carbon footprint to allow use of alternative energy sources, energy-conserving design and equipment, and water-conserving and recycling features.

Public roads are maintained but not marked with traffic control signs or directional signs. Parking lots are adequate for the level of use through most of the year. Some unimproved roads must be closed due to heavy rains and flooding that may occur throughout the year.

Strategies:

- Plan and design an environmental education/visitor center for Central Arkansas NWR Complex at a suitable site on existing or newly acquired refuge lands within easy access of I-40 or Highway 64, or at the existing headquarters site, whichever is deemed most feasible and desirable. This facility would be used to educate the public about the Refuge System and the Complex, to provide a setting for appropriate environmental education programs and curricula, to provide visitor services, and to enable proper administration of public use programs.
- Revise the general refuge brochure and include a 4-panel fold out map.
- Develop one public use map that can be used for all brochures and kiosks, and that identifies the location of boat ramps and other public use facilities.

- On the kiosk maps, incorporate a small complete map with an enlargement of the individual areas and include “you are here” arrow.
- Place a sign in the public parking area at the headquarters that displays office hours.
- Place signs 0.5-mile north and south of the refuge headquarters on Highway 33 to alert visitors to its location.
- Consider ways to make kiosks more inviting to the public (e.g., use a different color scheme or a banner with refuge name.)
- Ensure that refuge brochures, maps, and other visitor services products are up-to-date and readily available to the public.

Cache River NWR Objective 4-3: Hunting

Provide and expand quality, compatible hunting opportunities as feasible and desirable.

Discussion: Biologically sound hunting is a legitimate activity on national wildlife refuges and is one of the six priority public uses identified in the Improvement Act to be given enhanced consideration over other uses, as long as it is found to be compatible with refuge purposes. Cache River NWR is open to the public for hunting – hunters are allowed to hunt anywhere not posted as “Area Closed.” Cache River NWR has an approved (step-down management) hunting plan but a revision will be completed after CCP approval (see Chapter IV for a schedule of all the refuge’s step-down management plans). Currently, access is allowed via walking, motor vehicle, ATV (September 1 to February 28; designated roads and parking areas only), bicycle, motorboat, canoe, and kayak. All vehicles, including ATVs and bicycles, are restricted to designated roads, trails, and parking areas. Public access to hunt areas may be closed at any time necessary to protect refuge resources or visitors. Horses/mules are prohibited. Mobility-impaired hunters may apply for a special use permit, to allow specialized access by ATV. The refuge participates in an annual hunt coordination meeting with the AGFC.

Cache River NWR is best known for its waterfowl hunting opportunities and hunters enjoy relatively high success rates. Waterfowl hunting has no limits on participation, but generally is self-regulated by hunting pressure or availability of water on the refuge. Use of retriever dogs is allowed. Commercial hunting or guiding is strictly prohibited.

Archery deer hunting is permitted and is open concurrent with the state season (October 1 – February 28); hunter numbers are not limited. However, hunter numbers are limited for the Quota Gun Deer Hunt, which is held in mid-November (currently 7 days). Currently, a maximum of 2,000 permits are issued on a first come, first served basis. Muzzleloader deer hunts are conducted in mid-October and late-December for a total of 8 days; participation is not limited. A 2-day youth deer gun hunt is conducted during the statewide youth hunt the first weekend in November, and hunter numbers are not limited. Managers review participation rates and deer harvest to guide future management decisions. All hunting programs are conducted within AGFC season frameworks, but some hunts are shorter than corresponding state seasons.

Fall turkey hunting is permitted, with seasons varying by refuge unit. Small game hunting is allowed in accordance with state regulations and with the use of steel shot and rim fire rifles. Dogs are allowed for quail hunting and are required for night hunting of raccoon/opossum. Dogs are allowed for rabbit and squirrel hunting, beginning December 1.

Law enforcement is provided by one collateral-duty law enforcement officer (refuge manager) and one full-time Complex law enforcement officer, with some assistance by AGFC game wardens.

Generally, law enforcement is inadequate for the number of hunters using the refuge. An additional law enforcement officer is needed to assist the four refuges within the Complex. Current staffing numbers allow for adequate administration of the hunting program.

Additional opportunities for youth turkey, waterfowl, and dove hunting could be provided without significantly increased amounts of staff time. There is also the potential to use increased deer hunting, to better achieve deer population objectives, for the general public in the form of additional quota permits during the Quota Gun Deer Hunt and/or additional hunt days.

Regulated trapping is a sound management tool that can aid the refuge in attaining habitat and wildlife management objectives and control nuisance wildlife. Beavers must be controlled to protect infrastructure and reduce damage to trees, impoundments, croplands, and other wildlife habitat. Additional problems result from habitat and infrastructure damage by nutria and feral hogs, disease-infected furbearers, and predators impacting priority wildlife species. Trapping for commercial purposes can be a biologically sound management tool that allows the refuge to control nuisance animals and reduce associated negative impacts at minimal cost to the refuge, while providing economic and recreational benefits to the public. Commercial trapping by the general public would be conducted during state trapping seasons, administered through special use permits, and trapper numbers could be regulated by quotas.

Strategies:

- Continue to conduct annual cooperative AGFC/refuge hunt coordination meetings and standardize hunting regulations across Arkansas national wildlife refuges and wildlife management areas, where and when feasible and desirable.
- Utilize hunt administration methods, such as quotas, permits, reduction in number of hunt days, and hunt zones if warranted, to maintain quality and safety of hunting activities, or to reduce conflicts with other public uses.
- Periodically evaluate hunter satisfaction and quality of hunts.
- If waterfowl hunting quality diminishes, modify current hunting practices, in conjunction with AGFC, to improve quality of hunts through methods such as reducing number of hunt days, reducing number of hours of daily hunting, or zoning hunt areas.
- Create additional opportunities for youth waterfowl, dove, deer, and turkey hunting as feasible and desirable.
- Create additional opportunities for big game hunters by expanding modern gun deer hunting if feasible and desirable.
- Create additional opportunities for small game hunters by opening up dove, snipe, and woodcock hunting to statewide seasons, if such action does not conflict with refuge purposes or other uses.
- Consider allowing hunting dog training (not field trials) specifically for facilitating hunting if such action does not conflict with refuge purposes.
- Consider allowing commercial trapping for furbearers under special use permit to control nuisance wildlife and protect refuge infrastructure, wildlife habitat, and priority wildlife species.
- Consider allowing hunting of furbearers in accordance with AGFC regulations, subject to any additional refuge-specific regulations or restrictions necessary to ensure compatibility, safety, hunt quality, and to minimize conflicts with other users.
- Annually evaluate the number of Quota Gun Deer Hunt permits issued to determine if any adjustments are necessary.

- Revise the hunt brochure to include a quick reference chart listing hunt dates, the phone number (800/482-9262) for reporting wildlife violations, and an improved map that better delineates the hunt units.
- Allow ATV access for hunting only and restrict access to designated roads, trails, and parking areas. ATV access will be permitted only from September 1 to February 28.
- Mobility-impaired hunters may apply for a special use permit, allowing specialized access by ATV.
- Monitor ATV access and modify as needed to mitigate any negative impacts to refuge habitats, infrastructure, and visitors, in compliance with Executive Orders 11644 and 11989.
- Monitor hunting activities and ensure the hunt program is administered in a compatible manner; modify practices as warranted.

Cache River NWR Objective 4-4: Fishing

Provide and expand quality, compatible fishing opportunities as feasible and desirable.

Discussion: The Cache River, numerous adjacent oxbow lakes, and man-made Miller Pond provide fishing opportunities from a boat and/or the bank. These waters provide habitat for popular fish sought by anglers including bass, catfish, crappie, and bream. Other fish species often caught include drum, carp, smallmouth buffalo, and gar. The best fishing opportunities are from spring through early summer, then again in the fall. Each year, 6 waterfowl sanctuaries, located approximately every 10 miles along the Cache River, are closed to all public use and entry from November 15 through February 28, which are clearly marked with “Area Closed” signs.

Recreational fishing (including bow fishing and frogging) is permitted year-round in accordance with state regulations and is one of the top two public activities on the refuge. In addition to fish and frogs, visitors may also collect crawdads (crawfish) for their personal use. No special permit is required for fishing in refuge waters.

The fishing program is administered under a Fishing Plan and Environmental Assessment approved in 1995, and a compatibility determination. An updated Fishing Plan will be completed following the approval of the CCP. Seven kiosks located at main access points to the refuge provide general public use information and maps. In addition, fishing regulations can be found in the annual Public Use, Hunting, and Fishing Brochure. Signs designating boundaries of the Managed Access Area were installed in 2004 to protect the re-discovered IBWO, and remain in place, but normal access is currently allowed into these areas. Commercial fishing is allowed under special use permit for rough fish to remove exotic species, reduce negative impacts of aquatic habitat, and provide economic benefits to the local community. Twenty special use permits were issued for commercial fishing in 2008. Fishing tournaments are prohibited on refuge waters. No user conflicts have been apparent with recreational or commercial fishing.

One issue that needs to be addressed is littering by bank fishermen. Due to minimal staffing, only one full-time law enforcement officer and one collateral-duty officer are available to patrol the refuge, which encompasses 70 miles of river and associated tributaries, lakes, and floodplain forests situated over four counties. Law enforcement assistance is provided by AGFC wildlife officers.

Public access for fishing is allowed via automobile, bicycle, walking, motorized boat, and canoe/kayak. The refuge provides a total of 36 boat ramps: five concrete ramps along the Cache River; 17 gravel ramps, mostly on the chain lakes; and 14 primitive ramps in more secluded areas.

Directional signs for many of the ramps exist along the roadways. During high water and flood events, many refuge access roads are gated and closed to vehicles. While gated and flooded, motorized boats frequently use the roads as running lanes, which allows access to excellent fishing areas. ATVs, horses/mules, and airboats are prohibited year-round for fishing access.

A 2.5-acre former minnow pond has been converted to a catfish pond (Miller Pond) and is now used annually for the refuge youth fishing derby. Just before the derby, the pond is typically stocked with about 3,000 pounds of catfish. This provides for a high catch success rate and the derby now attracts more than 200 participants. National and local sponsors have partnered with the refuge to make this a very successful and well-attended community event. No facilities exist at the site and all fishing is from the bank. Due to excessive littering and other undesirable activity at this site, the refuge has closed this area to public entry and use and is planning to maintain it exclusively for fishing and other special events. In 2008, special fishing days were held at Miller Pond for McCrory Elementary School "Hooked on Fishing, Not on Drugs" program and the Woodruff County Health Center (long-term care facility). These events were very well received by participants. Special events such as these promote fishing as a legitimate recreational activity, provide the public with a better appreciation for the role of the refuge in the community, and provide opportunities for outreach and education.

Strategies:

- Update the brochure map to increase visitors' recognition of refuge access points for fishing.
- At Miller Pond, consider improvements that would aid universal accessibility.
- Work with the Service fisheries biologists to improve the refuge's fisheries and aquatic habitats where feasible.
- Expand if feasible and desired, special fishing events to further the accomplishment of refuge goals and Refuge System mission.
- Monitor fishing activities and ensure the fishing program is administered in a compatible manner; modify practices as warranted.
- Periodically evaluate angler satisfaction and quality of the fishing experience on the refuge.

Cache River NWR Objective 4-5: Wildlife Observation and Photography

Provide and expand quality, compatible wildlife observation and photography opportunities as feasible and desirable.

Discussion: Currently, there are few facilities developed specifically for wildlife observation and photography, but due to the location of the refuge, abundance and diversity of wildlife, and improved access, opportunities abound for visitors seeking to view wildlife. Access to the refuge for wildlife observation and photography is typically allowed 24 hours a day, 7 days a week. However, 6 waterfowl sanctuary areas, comprising 5,200 acres along the Cache River, are closed to all public entry and use from November 15 – February 28 annually. Visitors can use 144 miles of gravel roads for automobile access, and 36 boat ramps are located throughout the refuge that provide boat, canoe, and kayak access to the Cache River and numerous oxbow lakes. A birding trail is located on the George Tract and numerous abandoned roads, logging trails, and game trails enable visitors to view and photograph refuge habitats and wildlife on foot. Horses/mules and ATVs are prohibited year-round for wildlife observation and photography.

Much excitement was generated in the area during 2005, when the announcement was made that an IBWO had been sighted on the refuge. At that time, special public access regulations were put in place to protect the species, which had been thought to be extinct for 60 years. Informational kiosks were installed at various refuge locations to provide identification details for the IBWO. Visitors are encouraged to keep a watchful eye out for this species and report any findings to the refuge.

For visitors who make the effort to access the "back woods" of the refuge, a variety of wildlife may be spotted, including white-tailed deer, river otters, raccoons, beavers, bobcats, black bears, wild turkeys, squirrels, rabbits, quail, numerous reptiles and amphibians, egrets, herons, and many songbirds. Beginning in early November, waterfowl, including hundreds of thousands of Mallards, arrive to overwinter in what is currently considered by the NAWMP to be the most important wintering area for Mallards in North America. Refuge bottomland hardwood forests provide an excellent food source, consisting of dozens of species of invertebrates, hard mast, annual seeds, and natural vegetation for Mallards and other ducks. This high-protein and carbohydrate-rich diet prepares a healthy broodstock, as the ducks depart for spring nesting grounds in northern parts of the continent. Managed, flooded farm fields and moist-soil units also provide good waterfowl habitat and some waterfowl viewing and photography opportunities exist along highways.

Perhaps the most noticeable wildlife during summer months are the abundant songbirds in the hardwood forests and swampy areas. Songs of dozens of species of birds are easily heard at every stop. Indigo Buntings, White-eyed Vireos, Carolina Wrens, Cardinals, Chickadees, Tufted Titmice, Eastern Wood Peewees, and a variety of woodpeckers are among the more common of the passerines.

Strategies:

- Install a trailhead kiosk at the start of the birding trail on the George Tract that provides information about the length of the trail and viewing highlights along the way.
- Improve and maintain the surface of the birding trail on the George Tract, and install wayside exhibits at points of interest along the trail.
- Develop a canoe trail on Bayou DeView or Cache River, if feasible.
- Develop observation towers at the Plunkett and Dixie Farm Units and Howell Tract.
- Develop an observation structure at Bayou DeView on Highway 17, if feasible and desirable.
- Monitor wildlife observation and photography activities and assess any potential negative impacts to refuge habitats, wildlife, or visitors to ensure compatibility, and modify activities to eliminate or minimize conflicts.

Cache River NWR Objective 4-6: Environmental Education and Outreach

Provide and expand quality, compatible environmental education and outreach opportunities as feasible and desirable.

Discussion: The refuge currently provides environmental education programs upon request from local schools, community groups, university classes, wildlife clubs, and garden clubs. There are several elementary, middle, and high schools in communities, such as Searcy, Brinkley, and Newport, that are all within an hour's drive of the refuge. Little Rock and Memphis are both over one hour away, which may to be too far for their school groups to travel; however, the refuge could be utilized by scout groups from these cities.

Opportunities exist in the immediate local communities for educational programs involving Boy Scout groups. There are three universities within the vicinity and instructors and students display occasional interest in the refuge. No facilities are available on the refuge to support formal, on-site education programs. AGFC's Education Division has approximately 60 staff located across the state and effective partnerships could be created to support this activity.

The refuge staff has not developed outreach plans for communicating important individual resource issues to the public or for addressing long-term resource issues important to the refuge, the community, or other audiences (e.g., waterfowl and migratory bird management, wetland restoration, and endangered species such as the IBWO). Some members of the community have negative attitudes or resentment about the refuge, due to federal ownership. Conversely, a good deal of support exists as well.

The Service and Refuge System messages are incorporated into refuge programs. The key wildlife and habitat conservation messages for the refuge would include importance of wetlands (particularly bottomland hardwood ecosystems), endangered species, such as the IBWO, and the value of the refuge as important habitat for wildlife. The importance of the refuge as a critical wintering ground for waterfowl also should be emphasized. These messages should be communicated through outreach activities, such as when the refuge manager delivers programs both on and off the refuge. The refuge also uses news releases, an internet website, and personal contacts to communicate outreach messages.

Strategies:

- Recruit a park ranger (Visitor Services manager) to plan, develop, and implement an environmental education program for the refuge.
- Develop three education programs, with assistance available from the Regional Office, to present on request, covering such topics as waterfowl, shorebirds, migratory birds, and habitat management programs.
- Partner with Boy Scout troops to enable refuge staff to serve as merit badge counselors for badges such as Bird Study, Environmental Science, Fish and Wildlife Management, Fishing, Forestry, and Mammal Study.
- Recruit and train volunteers to provide select environmental education and outreach programs/activities on and off the refuge.
- Continue to develop and maintain effective communications and information exchange with congressional staff.
- Continue to work with local TV and radio stations and newspapers to expand opportunities for outreach.
- Conduct an annual media day or open house event sometime around National Wildlife Refuge System Week or before the waterfowl sanctuary closes in November; partner with AGFC and others to implement this event.
- Evaluate whether the refuge could better accomplish outreach and promote community support by joining one of the local chambers of commerce or one or more appropriate community/civic organizations.

Cache River NWR Objective 4-7: Interpretation

Provide and expand quality, compatible interpretation opportunities as feasible and desirable.

Discussion: Currently, waterfowl and migratory bird management are the primary themes and messages that are interpreted on the refuge. There is no indoor space dedicated to resource

interpretation for visitors. The headquarters is too small and the structure is inadequate for interpretive displays. The refuge offers a general brochure, posters, bookmarks, magnets, rulers, and stickers with general interpretive messages. A small area in the office contains animal pelts, skulls, and wildlife specimens that can be viewed by the public. The refuge also has seven kiosks in various locations that offer space for hunting, access, and regulatory information and these could be utilized for additional interpretive messages. At present, there are no portable exhibits or displays for interpreting key resources to off-site audiences. An upgrade to the interpretive birding trail at the George Tract is being planned.

Strategies:

- Develop and install interpretive panels at the porch area of the new Headquarters (whenever constructed), at the observation towers, at major access points to the refuge, and at the Interpretive Birding Trail on the George Tract, that would cover a range of interpretive themes such as: (1) Purposes and significance of Cache River NWR; (2) migration of waterfowl and shorebirds; (3) benefits of providing waterfowl sanctuary; (4) need for reforestation; (5) managing forest habitat for migratory birds; (6) cropland and moist-soil management for waterfowl and shorebirds; and (7) priority public uses of the Refuge System.
- Maintain a portion of the Howell Tract as a demonstration/public use area, including an observation tower and an interpretive trail with signage about the various habitats and wildlife observed and associated management practices.
- Develop signage at reforestation areas that displays the dates when sites were reforested and include interpretive panels about the reforestation process at select sites.

REFUGE ADMINISTRATION

Cache River NWR Goal 5: Provide support and sufficient resources necessary to ensure that goals and objectives for habitats, fish and wildlife management, resource protection, visitor services, and refuge administration are achieved for Cache River NWR in particular and Central Arkansas National Wildlife Refuge Complex overall.

Discussion: Both the Biological Review and the Visitor Services Review teams specified additional staffing, facilities, and equipment needed to implement the refuge's purposes, vision, goals, and objectives identified in this CCP.

Cache River NWR Objective 5-1: Staffing

As resources become available, strategically add staff that will improve the capacity and capability of Cache River NWR to achieve its legislated purposes and accomplish conservation and management goals and objectives.

Discussion: An additional law enforcement officer would help the refuge and the Complex protect critical wildlife and habitat resources, as well as the safety of staff and the public. This position is also necessary to accommodate proposed expansion of the refuge's visitor services program.

No visitor services staff exists on Cache River NWR or the Complex. Existing staff have neither the expertise nor the time to devote to expanded public use on the refuge. A park ranger (Visitor Services manager) must be recruited to develop and implement a visitor services plan as part of a comprehensive visitor services program for Cache River NWR. Additional responsibilities would

include expanding the volunteer and intern program and coordinating the establishment of a Friends Group. Environmental education and outreach programs would be implemented that would promote the refuge and help connect over 1,000,000 residents with nature. Development of an on-site interpretive program would involve updating and/or creating various printed materials, such as brochures and bird, reptile, and amphibian lists. The Visitor Services manager also would coordinate planning and development of public use facilities, kiosks, information stations, nature trails, and observational towers and blinds.

A supervisory wildlife refuge specialist is needed to assist with increased administrative burdens, greater scope and complexity of refuge programs, and to supervise management projects. Enhanced biological, habitat, and land acquisition programs will require additional resource specialists and maintenance personnel to plan and implement management projects and to operate and maintain facilities, infrastructure, and equipment.

Strategies:

- Upgrade current office assistant and biologist positions on Cache River NWR to appropriately reflect the true scope, complexity, and effect of their duties and responsibilities within the individual refuges and the Complex.
- Recruit a park ranger (Visitor Services manager) to fully develop and coordinate a comprehensive visitor services program for the refuge and the Complex.
- Recruit a realty specialist to coordinate land acquisition and survey management projects on the Complex and other refuges in Arkansas and adjacent states.
- Recruit a biological technician to assist with inventorying, monitoring, moist-soil, and other biological programs on Cache River NWR and the Complex.
- Recruit an assistant forester to assist with planning, development, and implementation of the forest management program on Cache River NWR and the Complex.
- Recruit a forestry technician to assist with forest inventory, silviculture, reforestation, invasive plant and animal control, and other habitat management programs on Cache River NWR and the Complex.
- Recruit a full-time park ranger (law enforcement) to provide adequate visitor and resource protection and assist with outreach efforts on Cache River NWR and the Complex.
- Recruit an ecologist with Complex-wide responsibility to plan and implement ecosystem management and strategic habitat conservation, coordinate research projects, and coordinate with partners on landscape scale projects.
- Recruit a natural resource planner to coordinate preparation and implementation of CCP projects, step-down management plans, appropriateness and compatibility determinations, and NEPA processes on refuges in Area 1 (Arkansas, Louisiana, Kentucky, and Tennessee) and elsewhere.
- Recruit a supervisory wildlife specialist to assist with administrative needs, provide daily supervision of staff, and coordinate operations and management projects on Cache River NWR.
- Recruit an additional office assistant to assist with administrative, clerical, and data management programs on Cache River NWR and the Complex.
- Recruit a facilities operations specialist to coordinate operations and maintenance of Service-owned assets on the Complex.
- Recruit an engineering equipment operator to assist with implementation of habitat management, facilities maintenance, and visitor services facilities projects on Cache River NWR and the Complex.

- Recruit a laborer to assist with maintenance and repair of equipment, facilities, and infrastructure, and assist with implementation of habitat and biological programs on Cache River NWR.
- Recruit a hydrologist to be based at Big Lake NWR to coordinate hydrological and water quality issues on all refuges within the Complex, coordinate hydrological research and monitoring, provide technical advice to adjacent landowners, serve as a liaison with COE, and coordinate aquatic restoration projects.

Cache River NWR Objective 5-2: Volunteers, Partners, and Friends

Expand the volunteer and intern program, establish a Friends Group for the refuge, and cooperate with partners to accomplish refuge goals and objectives.

Discussion: The refuge has a small number of active volunteers and seasonal interns. The majority of volunteer time spent at the annual Fishing Derby. These volunteers sign volunteer agreements and their time is recognized by "Thank You" notes and gifts, as well as recognition in local newspaper articles. The refuge does not have a Friends Group, but the Friends of Felsenthal help the refuge with funding for special projects on occasion and sale of refuge maps at the visitor contact station. There is potential to work with local Boy Scouts groups on volunteer projects. Scout troops often seek out community service activities, and individual Scouts pursuing the Eagle Scout rank must conduct projects that benefit the community and nation.

Strategies:

- Recruit a park ranger (Visitor Services manager) to coordinate volunteer, friends, and partner programs.
- Develop a list and descriptions of projects that volunteers and interns can assist with to facilitate accomplishment of refuge programs.
- Periodically place articles in local papers describing volunteer opportunities at the refuge, projects volunteers have accomplished, and promoting the volunteer program.
- Recruit Boy Scout troops for assistance with specific projects that would enable them to contribute to community service activities, and offer opportunities for Scouts pursuing their Eagle Scout rank to perform projects that benefit the community and nation at the refuge.
- Coordinate with universities in Arkansas and elsewhere to recruit high-quality interns to assist the refuge with operations, inventory, and management programs.
- Recruit volunteers from local universities, high schools, church groups, and civic organizations.
- Conduct a community open house on the refuge to promote volunteer opportunities and a Friends Group.
- Enlist volunteers and community leaders to assist with establishing a Friends Group for Cache River NWR and consult with other refuges that have successful Friends Groups to learn from their experiences in establishing such groups.
- The refuge manager and visitor services manager should attend Friends Group training.

Cache River NWR Objective 5-3: Facilities, Infrastructure, and Equipment

Acquire and maintain all of the facilities, infrastructure, and equipment necessary to perform habitat management, restoration, and improvement on the refuge in addition to maintaining and improving essential infrastructure such as roads and levees.

Discussion: Although funding is not currently available to construct a facility that would adequately meet the needs of the public and the staff, a project for an environmental education/visitor center is in the Service's 5-year construction plan for a facility estimated to cost approximately $4 to $6 million. The proposed facility would be approximately 3,500 to 4,500 square feet in size, and would include staff offices, conference room, auditorium, environmental classrooms, exhibit and display areas, breakroom, staff and public restrooms, secure law enforcement storage, utility/storage closets, fax/photocopy/file rooms, mudroom, bookstore, friends group office, and volunteer/receptionist office. This facility would be fully ADA-compliant and provide adequate administrative function. It would enable suitable opportunities for visitor reception, environmental education and outreach, interpretation, and public meetings. The building design would incorporate greening features, including energy-conserving lighting, HVAC and insulative qualities, water-conserving systems, and alternative energy. The building would be designed and constructed to reduce its carbon footprint and lessen environmental impacts, and also would provide a safe and comfortable environment for staff and visitors. Additionally, there would be sites for interpretive foot trails, wayside exhibits, and outdoor kiosks.

The environmental education/visitor center could be sited within approximately 5 miles of I-40, on exising or newly acquired refuge lands accessed from either the Brinkley or Biscoe exits, on refuge lands accessible from Highway 64 near Augusta/McCrory, Arkansas, or in the current location at Dixie, Arkansas, whichever area is assessed to be the most feasible, practical, and desirable. The current office and maintenance buildings would be retained for operational purposes, unless the Dixie site is selected for the new facility, then the current office building would be removed and full administrative capabilities would be incorporated into the design of the environmental education/visitor center. Project funding would include planning/design, engineering, construction, furniture, interpretive exhibits, landscaping, and parking areas.

Heavy equipment such as excavators, backhoes, road graders, dump trucks, and tractors are essential for active habitat management/manipulation and maintenance of infrastructure on national wildlife refuges. The refuge contains over 100 miles of primitive surface and gravel public access roads, boat ramps, parking areas, over 10 miles of levee systems, moist-soil impoundments, and ditches that require annual maintenance.

Strategies:

- Plan and design an environmental education/visitor center for the Central Arkansas NWR Complex at a suitable site on existing or newly acquired refuge lands within easy access of I-40 or Highway 64, or at the existing headquarters site, whichever is deemed most feasible and desirable. This facility would be used to educate the public about the Refuge System and the Complex, to provide a setting for appropriate environmental education programs, to provide visitor services, and to enable proper administrative functions.
- Keep all machinery, equipment, facilities, and infrastructure in good working order by regular upkeep and maintenance.
- Annually update and maintain the Equipment Priority Index (EPI) report to identify station heavy equipment needs.
- Expand the existing equipment storage pole shed to provide adequate storage for all refuge light and heavy equipment.
- Construct an environmentally compliant heavy equipment washing pad area adjacent to the existing equipment storage shed.
- When feasible, share equipment with other refuges in the Complex or refuges in Arkansas and surrounding states to minimize need for additional equipment purchases.

- Replace heavy equipment within the guidelines and time frames established by the Regional Heavy Equipment Coordinator, including:
  - 1992 John Deere 410D Backhoe.
  - 1991 John Deere 4555 tractor.
  - Two 1998 John Deere 6400 tractors.
  - 1997 John Deere 770C road grader.
  - 1999 Sterling truck tractor.
- Recruit an additional engineering equipment operator and a laborer to assist with implementation of habitat management, visitor services, and maintenance projects, and maintain facilities, infrastructure, and equipment.
- Recruit a facilities operations specialist to coordinate operations and maintenance of Service-owned facilities, infrastructure, and equipment on the Complex.

WAPANOCCA NATIONAL WILDLIFE REFUGE

NOTE: All goals, objectives, and strategies described below for Wapanocca NWR are set in the time context of the 15-year planning cycle of this CCP.

FISH AND WILDLIFE POPULATION MANAGEMENT

Wapanocca NWR Goal 1: Manage and protect migratory birds and native wildlife populations on Wapanocca NWR to fulfill the purpose for which it was established and to contribute to the mission of the Refuge System.

Discussion: Wapanocca NWR was set aside, as was each refuge in the Complex, to provide habitat for migrating and wintering waterfowl. Originally the site of the prestigious Wapanocca Outing Club, a hunting club formed in 1886, it has since been managed to attract waterfowl for more than a century. At least 200 species of upland and wetland birds are known to breed, winter, or migrate through the general refuge area. As such, Wapanocca NWR fulfills an important role in the bird life of the MAV. Wapanocca NWR offers a diverse mix of habitats for birds and other native wildlife, that range from mature forests to recently reforested farmlands, scrub-shrub habitats, forested swamps, moist-soil areas, and a shallow reservoir with mudflats and fringes of emergent wetland vegetation.

Wapanocca NWR Objective 1-1: Migratory Waterfowl

Provide habitats on Wapanocca NWR sufficient to meet the habitat and population goals of NAWMP as stepped-down through the LMVJV.

Discussion: Concern over waterfowl population declines in the 1980s resulted in establishment of the NAWMP, which focused the attention of federal, state, and private conservation groups on critical wintering and breeding areas. The LMVJV, which encompasses all four refuges in the Complex, was selected as one of the wintering habitat focus areas. One of the first tasks faced by the LMVJV was to develop a model or decision tool for determining how much habitat was needed, and a method for relating this objective to the population goals of the NAWMP. The solution was to consider wintering areas as responsible for contributing to the spring breeding population goals of NAWMP proportional to the percentage of ducks historically counted in wintering areas (Loesch et al., 1994; Reinecke and Loesch 1996). In order to contribute ducks to spring breeding populations, wintering areas must provide sufficient habitat to ensure adequate winter survival. To quantify winter habitat requirements, the LMVJV had to identify limiting factors and made an assumption that foraging habitat was the most likely factor to limit waterfowl populations in the LMV (Reinecke et al., 1989). The process of relating habitat objectives for individual management areas to overall habitat objectives for the LMV involved several steps (Biological

Review for Bald Knob and Cache River NWRs, USFWS 2008). Step-down objectives were established for Wapanocca NWR (Table 12). DED objectives were calculated by multiplying the acreage objective by the assumed DED standard developed by the LMVJV for that habitat type.

Table 12. Wapanocca NWR - Current migrating and wintering waterfowl foraging habitat objectives established by the LMVJV

Habitat	Objective[1] Acres (DED)[3]	Current Capability[2] Acres (DED)[4]	(+ or -) Acres (DED)
Moist-soil	138 (257,784)	200 (373,600)	+62 (+115,816)
Bottomland Forest	317 (39,942)	41 (2,809)	-276 (-37,133)
Unharvested Crop	85 (1,072,870)	68 (223,470)	-17 (-849,400)
Harvested Crop	0 (0)	0 (0)	0 (0)
Forested Swamp	0 (0)	2,354 (13,314)	+2,354 (+13,314)
Total	**540 (1,370,596)**	**2,663 (613,193)**	**+2,123 (-757,403)**

[1]Acreage and DED objective provided by the LMVJV office 2003.
[2]Current acreage and DED capability (has levees and water control structure, some have pumping capability) provided by refuge staff.
[3]DED estimates, calculated by using standard DED figures provided by LMVJV.
[4]Updated DED estimates adopted by the LMVJV Waterfowl Working Group in June 2006: moist-soil, 1,868 DEDs/ac; bottomland hardwood, 191 DEDs/ac; unharvested crop, 14,061 DEDs/ac (estimate based on actual acres of various grain crops left unharvested and flooded during the winter period); harvested crop, 287 DEDs/ac (estimate based on actual acres of various harvested grain crops flooded during the winter period).

This refuge has opportunities to provide most components of waterfowl foraging habitat (e.g., grains, browse, moist-soil, wooded swamp/bottomland forest, aquatic plants) in conjunction with necessary sanctuary. Much of the refuge's original open lands (croplands) have been planted back to hardwood forest; however, the refuge still provides some habitat for Canada Geese, White-fronted Geese, and Snow/Blue Geese. Although use by Canada Geese has declined, it is important that the refuge maintain its capability to harbor geese – a species group with high site fidelity. Current NAWMP plans for geese in the Mississippi Flyway include the objective of providing geese with suitable habitat on traditional southern wintering grounds; thus, there is a need for some open lands and agricultural crops. In order to best achieve refuge purposes given the current and expected waterfowl use patterns at Wapanocca NWR, it is necessary to re-evaluate the current cooperative farming program and implement modifications that would better enable the refuge to fulfill its purpose. Priorities for habitat management need to be adjusted to provide better habitat for other migratory birds that will use the refuge more intensively than Canada Geese. These adjustments will result in reductions in

annually farmed acreages and increases in grassland/scrub-shrub habitat management adjustments in types/acreages/locations of crops grown, and intensification and expansion of moist-soil management programs. See Wapanocca NWR Objective 2-3 for specific details in modifying this program. All other farming/moist-soil strategies discussed under Objective 1-1 eventually will be dependent on the outcome of this assessment.

The refuge has 32 moist-soil units, totaling about 288 acres. Unless intensively managed, the suitability of such units to provide needs of wintering waterfowl will decline. Greater flexibility is needed to intensify moist-soil management to include rotating units into the refuge crop-share and cultivating hot foods in these units as a means to set back woody encroachment and control pest plant invasions.

Flooded bottomland forest habitats not only provide food in the form of acorns, fleshy fruits, and invertebrates, but also provide cover, sanctuary, and nesting sites. However, the quantity of actual winter and early spring flooded forests is estimated to provide only 10-15 percent of the refuge's total desired DEDs.

The refuge's 600+ acre Wapanocca Lake is a waterfowl site of major importance. It is crucial as a sanctuary, roosting, feeding, and gathering area. The lake attracts large numbers of dabbling and diving ducks, as well as geese and other non-game waterbirds. Currently, Wapanocca Lake is believed to be the major regional sanctuary site for peaks of over 150,000 ducks and geese. Much care is needed to ensure the long-term biological integrity and environmental health of this lake system.

Another refuge management practice of critical importance is maintaining a high degree of waterfowl sanctuary (area free of disturbance) in several areas within this relatively small refuge during key waterfowl and waterbird use periods - November through February/March. Extensive movements and frequent flight induced by excessive disturbance can have immediate direct and subsequent indirect negative impacts to waterfowl. During this critical period, disturbance to waterfowl must be kept to a minimum to allow them to maintain proper body weight, conserve energy, and build fat and protein levels.

Strategies:

- Minimize human disturbance to wintering waterfowl and migrating shorebirds on Wapanocca Lake by closing the lake to all public entry and use from December 1 through February 28, and limiting other activities, such as bird observation, use of observation blinds, and aerial flyovers, to those necessary for official avian surveys.
- Assess the current and expected waterfowl use of the refuge. If goose numbers of <12,000 per year are expected, then in conjunction with AGFC and the Service's Division of Migratory Birds, determine appropriate adjustments to the cooperative farming program to best achieve refuge purpose and modify the cropland management program accordingly. Proposed modifications to current waterfowl habitat management practices (see Objectives 2-3) include:
    - Adjusting the types, acreages, and/or location of crops grown as necessary to provide forage that will be extensively used by wintering waterfowl;
    - Decreasing underutilized (by waterfowl) farmed acreages by converting such croplands to areas managed in grassland/scrub-shrub habitats;
    - Intensifying and expanding moist-soil management practices in order to best accommodate waterfowl needs;
    - If additional cropland is later required to meet DED needs, return some grassland back to the farming program for use as winter green browse.

- If no adjustments are made to the current cropland management program, then the following strategies would be implemented:
  - Provide for the hot food needs of a mixture of Canada, White-fronted, and Snow Geese in open fields away from forest tree lines, using cooperative farming or force account farming to plant green browse (wheat) in September in open fields (to be available by early November) in order to meet foraging objectives for wintering geese.
  - Establish and maintain up to 85 acres of unharvested grain crops (mix of milo, millet, corn) in several floodable portions of the wetland impoundments. Rotate such crops every 2 to 3 years in certain moist-soil areas to help set back succession.

Wapanocca NWR Objective 1-2: Wood Ducks

Improve Wood Duck nest/brood habitats and help meet banding quotas to ensure adequate monitoring of the flyway population.

Discussion: In addition to providing food in the form of acorns, fleshy fruits, and invertebrates, flooded bottomland forest at Wapanocca NWR also furnishes cover, sanctuary, and nesting sites for Wood Ducks. These forests and associated swamp and scrub-shrub wetlands are preferred habitat for Wood Ducks, but additional cavity sites can be provided by managing larger, older trees, and maintaining a Wood Duck nest box program. Suitable habitats for Wood Ducks nesting or brooding, such as emergent wetlands, scrub-shrub wetlands, and green reservoirs, should be favored in habitat management activities.

Strategies:

- Use the Service's brochure, "Increasing Wood Duck Productivity," to help guide Wood Duck management activities on the refuge.
- Recognize importance of suitable natural cavities and favor those tree species most likely to develop suitable cavities, namely older trees with longer growth periods, in forest management practices.
- Maintain quantity and quality of beaver ponds, emergent wetlands, scrub-shrub wetlands, and greentree reservoirs as feasible and desirable for the benefit of Wood Ducks and other duck and waterbird species, and appropriately maintain and enhance these habitats for breeding, nesting, and brood-rearing where feasible.
- As appropriate, consider developing greentree reservoirs to provide inundation of suitable forest sites during late fall and winter periods. Mimic natural flooding regimes, and timely drawdowns to maintain vigor of trees.
- Properly install and maintain Wood Duck boxes as needed.
- Meet refuge preseason (July 1 – September) banding quotas.

Wapanocca NWR Objective 1-3: Shorebirds and Other Wetland Bird Species

Provide foraging and sheltering habitats for high-priority shorebirds and other wetland bird species during nesting and migration periods.

Discussion: Little Blue Heron and King Rail are high-priority focal species for the Service that occur on the refuge strictly in wetland habitats. For these and other wetland-dependent bird species, adequate water levels, including appropriate fluctuations in the lake, lake marshes, and forested wetlands will be important for these species. This suite of species, which also includes Great Blue Heron, Snowy Egret, American Bittern, and numerous shorebirds, such as Least Sandpiper, Solitary Sandpiper, and Greater

Yellowlegs, requires a diversity of habitats for nesting and foraging, such as mudflats and shallow water, areas of tall, emergent marsh vegetation, and bottomland hardwood forests.

Additionally, several of the moist-soil sites should be capable of hosting numerous shorebird species that require shallow wetlands or mudflats during late summer and early fall. Management of moist-soil units for a wide range of waterbirds (herons and egrets) and shorebirds (sandpipers, plovers) should not interfere with waterfowl habitat objectives.

King Rails prefer areas with a moderate percentage of tall, emergent marsh vegetation mixed with areas of open water, areas of dry ground, and mudflats. In some cases, these conditions can also be provided in moist-soil units, although vegetation and bird response should be closely monitored to assure that refuge objectives are being met and that the unit does not succumb to encroachment of woody plant species.

Little Blue Herons prefer shallow water areas for forage sites, including lake edges, moist-soil management units, and button bush swamps. Nesting usually occurs in young trees, such as willow or cottonwoods, and herons nest in colonies, sometimes with other species, such as Snowy Egrets or Black-crowned Night Herons.

A large Great Blue Heron/Great Egret rookery is often located in cypress trees north of the lake. Such rookeries should be afforded a sanctuary setting during nesting and brood-rearing periods in early spring and summer to minimize human disturbance.

Strategies:

- Manage water levels, as feasible, in impoundments and other wetlands to provide some shorebird and marshbird habitats during late summer and fall.
- Manage at least one moist-soil impoundment annually for shorebird use (e.g., drawdowns in late summer, exposed mudflats) and rotate that unit among others over time as appropriate.
- Utilize lake drawdowns to produce mudflats for shorebird use on a periodic basis, such as on alternate years or every 3 to 4 years.
- Develop a capacity on some moist-soil units to provide for water depths of 8 to 10 inches in late summer on those sites with larger emergent vegetation, to provide habitat for King Rails if feasible.
- Identify wading and waterbird rookeries on the refuge and minimize disturbance to these areas during nesting and brood-rearing periods, using signage or other markings.

Wapanocca NWR Objective 1-4: Forest Breeding Birds

Maintain and enhance nesting and foraging habitats for priority forest bird species for the MAV (Bird Conservation Region 26).

Discussion: In many areas of the MAV, minimum forest block size, forest fragmentation, and poor stand quality are issues affecting forest breeding birds. Due to Wapanocca NWR's relatively small size and the amount of adjacent farmland, the refuge is limited in its ability to provide a large, contiguous forest block. However, forest stand quality can be improved using appropriate silvicultural treatments. Many forest birds depend upon dense understory and ground vegetation for nesting and foraging. Thus, desired future conditions in much of the existing mature forest stands would

emphasize increasing structural diversity by providing a more open overstory canopy, allowing sunlight to reach the ground and stimulate increased ground and understory cover.

To provide benefits for various priority forest birds, forest stand treatments should: (1) Encourage development of emergent trees that rise above the predominant forest canopy; (2) retain large diameter class trees; (3) provide large standing, dead, or dying trees; (4) contribute coarse woody debris to the forest floor; and (5) retain small diameter cavity trees.

Overall, the refuge will aim to sustain a functioning, mature hardwood forest, with such characteristics as a canopy diverse in height and structure, containing some canopy trees greater than 50 cm dbh, and exhibiting 60-80 percent closure in the mid-story, which will allow penetration of sunlight to the forest floor to stimulate regeneration of shade-intolerant species.

The refuge's current size is insufficient to meet many of the objectives associated with area-sensitive non-game bird species. Therefore, additional land acquisition is recommended to provide a 10,000+ acre refuge that includes a forested corridor connecting with the existing forests along the Mississippi River. The refuge should initiate the acquisition of lands associated with Ditch 8 and Wapanocca Bayou, as previously identified, then pursue additional land acquisition to create a forest block of sufficient size to support area-sensitive forest birds.

Strategies:

- Develop and implement a forest management plan that incorporates guidelines found in LMVJV's report, "*Forest Restoration, Management, and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife Habitat,*" in order to improve forest stand quality, with emphasis on providing sufficient understory and tree regeneration.
- Implement stand treatments that would produce forest openings of 1/2 to 2 acres to fully stimulate regeneration and promote understory structure.
- Encourage development of some super-dominant trees in each stand (large trees rising above the predominant forest canopy).
- Retain some dead/dying trees and maintain some cavity-forming specimens (i.e., large and small diameter cavity trees that exhibit potential to form cavities).
- Monitor bird responses to habitat treatments and adjust management actions as necessary to achieve objectives (adaptive management).

Wapanocca NWR Objective 1-5: Scrub-shrub or Early Successional Birds

Provide suitable conditions to satisfy the annual life cycle requirements of priority bird species associated with scrub-shrub and grassland habitats.

Discussion: Due to the amount of reforestation that has taken place at Wapanocca NWR over the past decade, a substantial acreage of early successional habitat is currently being provided that benefits priority scrub-shrub breeding species. In time, most of these reforested sites will succeed to more mature forested stands. However, buffer strips along forest edges and crop fields, as well as narrow corridor linkages between forest blocks, can be managed as scrub-shrub habitat.

Population data for non-game birds are limited for many MAV refuges. However, Wapanocca NWR has been fortunate to have had a volunteer, since 1999, that conducts breeding bird point counts each year during early summer. Survey points are located in the three refuge habitats types.

Strategies:

- Determine and provide the most beneficial combination of agricultural, grassland, scrub-shrub, and moist-soil habitats feasible to meet the needs of early successional bird species.
- Promote scrub-shrub and grassland habitats through use of mechanical, chemical, and prescribed fire techniques.
- Maintain early successional buffer strips along some forest edges and borders of crop fields to benefit bird species favoring this habitat condition.
- Maintain scrub-shrub corridor linkages between forest blocks.

Wapanocca NWR Objective 1-6: Grassland Birds

Provide habitat for high-priority grassland birds for the MAV (Bird Conservation Region 26) through management of grassland and open field areas.

Discussion: Although management for grassland birds is not a priority at Wapanocca NWR, some breeding species (e.g., Dickcissel, Eastern Meadowlark, Northern Bobwhite Quail) and some winter species (e.g., Henslow's Sparrow, Sedge Wren, LeConte's Sparrow, and Northern Harrier) will benefit from provision of this habitat in larger blocks (e.g., 25-100 acres). In areas where it is feasible and does not compete with reforestation efforts, agricultural areas that are underutilized by wintering waterfowl should be converted to native grasses and forbs.

Conversion should not result in weeds that characterize idle agricultural land, but should involve an intentional planting of warm season bunch grasses (e.g., little bluestem, Indian grass) and a large component of native forbs. These grass-forbs areas will require periodic disturbance (mowing or burning) to maintain vigor.

Land parcels that are isolated from existing forest habitat (e.g., some Farm Service Agency tracts) may be suitable for development and maintenance of additional grass-forbs habitat, unless implementation of these practices would create a habitat sink. These areas could be planted heavier to grasses and as a result may be more beneficial to birds breeding or wintering in grasslands.

Strategies:

- Provide up to approximately 250 acres of grassland habitats dominated by native grasses and forbs by converting underutilized croplands to grasslands.
- Manage grassland habitats by various methods, such as mowing, burning, or herbiciding, to create suitable nesting and foraging conditions for priority grassland bird species for Bird Conservation Region 26.

Wapanocca NWR Objective 1-7: Wildlife Species and Plant Communities of Concern

Manage habitats to support and sustain rare species and special plant communities.

Discussion: Almost 80 percent of the bottomland forests of the MAV region have been converted to other uses, primarily to agriculture. Much of the region's remaining forests are scattered and fragmented into small blocks, that often reduce the capacity of the landscape to support many species of wildlife. It is important that the remaining forests are conserved and managed to allow

continual regeneration of tree and plant communities supporting native wildlife species. The refuge's bottomland forests are indeed special habitats that need to be sustained, enhanced, and expanded.

The only rare plant species known to occur is the water spider orchid that requires water to be held in the Ditch 8 former channel to ensure its survival. A more in-depth botanical survey of the refuge may yield additional rare plant species. Other historical plant communities still occurring on the refuge that could be enhanced are switch cane and river cane. These cane communities are used by several bird species of concern, including Swainson's Warbler, Hooded Warbler, White-eyed Vireo, and American Woodcock.

Wapanocca NWR is used by several bat species including Rafinesque's big eared bat, southeastern bat, and the Seminole bat. Additional surveys for these mammals, plus appropriate forestry management practices, should help better document their occurrence and identify suitable habitats to be maintained. Rare avian species that use the refuge include the Interior Least Tern that prefers sandbars, and the Bald Eagle that nests in larger trees.

Extensive surveys for reptiles and amphibians have not been conducted on the refuge. Wapanocca NWR participated in the 2005-2006 survey for malformed amphibians. More than 1,000 frogs and toads were sampled and 23 were considered abnormal, mostly due to injuries. Additional surveys for reptiles and amphibians should be conducted to better understand how the refuge is being used by this wildlife component.

Strategies:

- Actively manage the refuge's bottomland hardwood forests to enhance conditions for species and communities of concern. Appropriate methods may include silvicultural harvests, reforestation, and protection from excessive flooding and siltation.
- Obtain baseline data on water quality in refuge streams and ditches, and identify any necessary restoration efforts.
- Inventory key stream, ditch, or canal areas for mussel inhabitation.
- Initiate baseline inventories for vegetative communities, reptiles and amphibians, and small mammals.
- Locate cane communities and create openings in the forest canopy to allow more sunlight to reach such sites to support and enhance these floral components.
- Investigate techniques to establish cane by plantings (if feasible, establish several cane experimental/demonstration plots).
- Monitor water spider orchid habitats and ensure the proper water conditions necessary for their survival.
- Continue locating Bald Eagle nests and primary foraging areas, and protect such sites from disturbance activities as necessary.
- Inventory bat populations and implement measures to improve or maintain favored roosting, maternal, and feeding habitats.

Wapanocca NWR Objective 1-8: Resident Game Species

As feasible, maintain a mix of open lands (e.g., agriculture, grasslands, scrub-shrub, reforested sites) to complement mature forested habitats and thus sustain healthy populations of resident game species.

Discussion: Wapanocca NWR contains a diversity of habitat types, such as forest, open land, scrub-shrub, and farmland, that hosts a variety of game species. The primary game species of public interest are white-tailed deer, squirrel, rabbit, quail, doves, turkey, and several furbearers. Many of these thrive in early successional habitats interspersed with mature forests.

Strategies:

- Maintain and enhance habitat conditions that incidentally benefit resident game species by implementing the following practices:
  - Maintaining brushy boarders along several large agricultural fields and/or ridge portions of some ridge-swale sites to provide additional small game habitat;
  - Conducting silvicultural operations (harvest) that enhance conditions for hard mast-producing trees;
  - As appropriate, reducing forest basal area through group selection cuts to ensure oak regeneration and to improve crown size/mast production;
  - When reforestation is undertaken, utilize a mix of species including hard and soft mast-producing trees if necessary to ensure a diverse mast supply.
- Coordinate harvest reporting with AGFC and determine if a need exists to collect additional data and what staff capabilities would be required to obtain such information.
- If in-the-field hunter checks are needed for harvested deer, consider use of university students or interns to obtain age/weight data.
- Continue deer spotlight surveys with the assistance of volunteers or local universities.
- Work with SCWDS to determine need for and perform deer herd health checks (every 4 to 7 years).

Wapanocca NWR Objective 1-9: Wildlife Inventorying and Monitoring

Improve and expand inventorying and monitoring of the refuge's fauna and prepare and implement an Inventorying and Monitoring Plan (IMP).

Discussion: The Improvement Act formally establishes the necessity of monitoring the status and trends of fish, wildlife, and plants on national wildlife refuges. Service policy is to collect baseline information on key plants, fish, and wildlife to monitor, as resources permit, critical parameters and trends of selected species and species groups on and around Service units, and to base management on biologically and statistically sound data derived from such inventorying and monitoring (701 FW 2, Inventorying and Monitoring of Populations).

Monitoring, inventorying, and surveying (MIS) are very important means for scientifically managing trust wildlife populations and habitat, as well as meeting national, regional, and refuge goals. Before any MIS is started, the surveyor should seriously and honestly determine if: (1) Objectives, which are clear, specific, and measurable, are defined and can be practically met; (2) the results will actually be used to benefit the resource or make informed decisions; (3) quality and quantity of data needed to meet the objectives can be collected; (4) the MIS methodology is scientifically and statistically sound; (5) the costs of conducting the MIS are worth the results; (6) resources are available or will become available to complete the MIS; (7) the method of data analysis is pre-determined; and (8) MIS is prioritized so if resources become limited, then more critical MIS will be conducted.

Adaptive management is a system used by refuge managers to improve results by documenting management actions, measuring and documenting biological responses, and adapting (modifying) management actions to improve desired conditions/outcomes and determine if objectives have been

met. Baseline inventorying and population monitoring at regular intervals provide data essential for informed decision-making by refuge managers and are fundamental for adaptive management. Inventorying and monitoring needs can often be met with the assistance of other Service programs and cooperative efforts with state resource agencies, universities, and USGS. Proper attention must be given to experimental and monitoring design, statistical procedure, and consistency in observation and data collection.

Inventorying and monitoring efforts for adaptive management purposes should be expanded to include additional refuge resources that lack sufficient baseline data such as reptiles, amphibians, bats, and mussels.

Strategies:

- Increase the biological capability of the refuge by adding a biological technician to conduct surveys, assist with monitoring and research programs, and perform other wildlife/habitat management activities.
- Prepare and implement an Inventorying and Monitoring Plan in accordance with Service guidelines to improve basic biological information on occurrence and distribution of fauna on the refuge.
- Cooperate with AGFC, other agencies, universities, and Service offices/programs (e.g., Ecological Services, Fisheries, Migratory Birds) to initiate specific inventorying and monitoring of wildlife and associated habitats on the refuge, including priority bird species for BCR 26, American Woodcock, reptiles and amphibians, and occurrence and habitat use of bats, mussels, fish, and aquatic macroinvertebrates.
- Perform contaminant studies (fish, sediments, water, and macroinvertebrate tissue sampling), particularly in Big Creek/Ditch 8 and recommend any necessary remediation.
- Improve waterfowl inventory and survey efforts, in cooperation with AGFC, by:
  - Standardizing ground and aerial waterfowl survey routes to be performed at least monthly starting in late October through early March,
  - Reporting waterfowl species numbers by units within the refuge, using the same waterfowl routes and times of day,
  - Ensuring funds are available for contracting with AGFC to provide monthly surveys conducted in conjunction with their regular nearby surveys, and
  - Performing aerial surveys of the refuge at least once during coordinated statewide mid-winter inventory.
- Increase knowledge of priority bird species for the MAV (BCR 26) and their responses to associated management practices by:
  - Coordinating with the Service's Division of Migratory Birds and other ornithological specialists to design and implement bird monitoring procedures that provide population status and trends information and nest productivity data,
  - Conducting point counts across major habitat types on the refuge during passerine nesting season (about May – June),
  - Conducting a series of randomly located roadside counts that survey typical habitats surrounding the refuge, within a 30-mile (50 km) circle around the refuge, if feasible,
  - Conducting a series of transects or block area searches for migratory birds during non-breeding seasons,
  - Monitoring known heron rookeries on the refuge for species composition, number of nesting birds, and nest production, and

- Using information derived from these actions to guide management for priority species at the refuge to contribute to ecoregional, regional, and range-wide population initiatives.

HABITAT MANAGEMENT

Wapanocca NWR Goal 2: Protect, restore, and manage the functions and values associated with diverse bottomland hardwood forest and open wetland systems in order to achieve refuge purposes, wildlife population objectives, and to benefit migratory waterfowl and other native wildlife.

Discussion: Refuge habitats are no longer part of a larger natural ecosystem that was once characterized primarily by: (1) Bottomland forests which were often inundated for frequent periods of time by the Mississippi River; and (2) periodic flooding actions of adjacent creeks and streams. Today, the refuge is essentially surrounded by agricultural lands, and its major sources of water within the watershed have been modified by drainage projects and leveeing of key streams, including the Mississippi River.

Historically, the Mississippi River played a major role in the formation and function of what is currently Wapanocca Lake. The lake is now an oxbow lake formed when the Mississippi River main channel changed its course. Currently, Wapanocca Lake is essentially cut off from a watershed that is required to periodically flush and refill the lake. Today, rainfall has become a main source of lake water, but there is not enough water to flush the lake of nutrient build-up or to more closely simulate the periodic water regimes most conducive to perpetuating a diverse bottomland forest and adjacent cypress/willow swamp habitats. The role of the lake in providing critical waterfowl habitat cannot be overstated. The emphasis on water level management should be directed toward providing maximum waterfowl habitat in order to achieve refuge purposes. This will require a shift in philosophy by refuge management and the public from the past practice of managing lake levels for maximum fishing opportunity to managing for waterfowl as its first priority.

Wapanocca NWR Objective 2-1: Moist-Soil Habitat Management

Expand and intensify management practices to increase food production for wintering waterfowl and migrating shorebirds on 175+ acres of moist-soil impoundments.

Discussion: The refuge should attempt to maintain 175-200 acres in high-quality moist-soil habitat, producing at least 500 pounds/acre of preferred seeds or at least 50 percent cover of desirable moist-soil plants. Unless intensively managed, moist-soil units will be of questionable value, dependent mostly on unpredictable and variable yearly weather conditions. The refuge should implement intensive management through timely water level manipulation to provide suitable foraging conditions for waterfowl, shorebirds, and other native wildlife, disking units at least every 3 years in a rotational system among units, use of wells (if feasible) to supply needed water, and weekly monitoring of results. Properly managed moist-soil areas will complement agricultural crops by increasing the quantity and diversity of plant and invertebrate foodsources for the benefit of a wide variety of waterfowl and other wildlife.

Strategies:

- Consult the July 2005 “Moist-Soil Management Guidelines for the U.S. Fish and Wildlife Service, Southeast Region” to aid in managing moist-soil units.

- Assess the need and feasibility of expanding the acreage of managed moist-soil habitats in conjunction with decreases in upland agricultural production in order to best achieve the refuge purpose for providing waterfowl habitat based on current and projected waterfowl use trends. Additionally, manage moist-soil units more intensively by periodically cultivating crops, such as millet, milo, and rice, within the units.
- Do not allow encroachment of woody vegetation into moist-soil units wherever topography is conducive to flooding units for production of moist-soil plants.
- Implement measures to achieve more reliable shallow water capability and sufficient water delivery to moist-soil units where and when feasible (e.g., use of wells, pumping, gravity flow).
- Conduct vegetation surveys in moist-soil units to indicate when disking or disturbance by other methods are necessary in order to maintain desirable plant species composition.
- When indicated by survey results, implement soil disturbance activities in moist-soil units on a rotational management basis (every 2 to 3 years), to maintain a desirable mix of habitats (e.g., a mosaic of habitats for late summer/fall, winter periods).
- Sample moist-soil units in the fall to determine the quantity and quality of waterfowl foods.
- Install water level gauges in each moist-soil management unit to enable monitoring of vegetation response to water depth within the first 30 days of drawdowns, and respond accordingly with appropriate water management action necessary to stimulate growth of preferred plant communities.
- Monitor and evaluate waterfowl use of moist-soil units at least monthly throughout the winter period. Correlate waterfowl use with water depths, vegetative conditions, and month to determine if modifications are necessary (adaptive management).
- Stagger drawdowns among units throughout the late spring and summer to provide diverse foraging habitats for shorebird and other water birds.

Wapanocca NWR Objective 2-2: Forest Management

Conserve, manage. enhance, and restore the values and functions of the refuge's bottomland hardwood forests to sustain the biological needs of migratory birds and other native wildlife.

Discussion: Approximately 4,100 acres or 75 percent of the refuge is forested, including over 900 acres of recently reforested open fields. It is the only large forested site for miles around, and is often characterized as an island of native forest habitat in a sea of surrounding agriculture.

The forestland of Wapanocca NWR is comprised of bottomland hardwood forest (670 acres), seldom-flooded forest (680 acres), recently reforested floodable bottomland (100 acres), recently reforested seldom-flooded bottomland (891 acres), and flooded bald cypress swamp (1,760 acres).

During the winter of 2005, 15 CFI plots, patterned after the Cache River NWR CFI plots, were established at Wapanocca NWR. These plots were established in all forested habitats on the refuge and will provide baseline information for forest planning and for long-term habitat monitoring.

Sites along the lake perimeter and low-lying areas are characterized as floodable bottomland forest. These forests are dominated by bald cypress overstories, usually with scant understory development. The forests are flooded annually for a substantial time, thus limiting the development of understory and midstory layers. Lack of disturbance has allowed the overstory to become closed, and often a substantial duff layer has resulted. As elevation increases on these sites due to accumulation of the duff and soil layers, the species composition shifts to include overcup and Nuttall oak on the lower

sites, then sycamore, elm, and sweetgum on intermediate sites, and eventually water and willow oak on the highest regularly flooded sites.

All of the higher forests at Wapanocca NWR are designated as seldom-flooded bottomland forest. Here composition ranges from the willow and water oak on lower sites up to cherrybark oak on the highest sites. Composition and structure are very similar to forest stands at Cache River NWR. The forests of Wapanocca NWR have not been logged or disturbed for about 60 years, and as a result, the overstories are closed, the midstory forests are diminishing, and understory reproduction is negligible.

Overall, the forests demonstrate species diversity, but they are fairly uniform in structure. There is a relatively narrow diameter range, so very large diameter trees are infrequent. The forests are virtually all even-aged and contain a single canopy. Vine, shrub, and herbaceous components are present, but are not abundant. The forests are generally stagnant and well into the stem exclusion stage that has reduced midstory and understory layers. Forest health problems, such as heart and root rot and hypoxylon canker, are becoming more apparent as trees continue to be stressed and stand health declines.

The purpose for the refuge is to serve as “an inviolate sanctuary, or for any other management purpose, for migratory birds.” In order to facilitate this purpose, the refuge must maintain a healthy, productive forest for native birds, both resident and migratory. Overall, the current forest habitat is lacking in terms of structure and becoming less productive as it stagnates, and it is failing in terms of shade-intolerant regeneration. A comprehensive evaluation is needed to address the health, distribution, and status of the forest communities from a wildlife perspective.

Now that a permanent forest monitoring system and an approved Forest Management Plan have been established, Annual Habitat Work Plans (AHWPs) need to be developed. The AHWPs should involve stand-specific inventories that will facilitate understanding of the habitat variables to determine necessary management actions. The baseline data from the CFI plots indicate it is time to implement forest treatments to benefit the refuge priority wildlife species. Species, such as migratory birds, American Woodcock, and resident wildlife, will benefit from forest treatments that result in stratification and development of lower vegetative layers. Additionally, such treatments should include group selection cuts about 1 to 2 acres in size in order to develop dense layers of understory browse, cover, and regeneration of shade-intolerant trees.

The needs of several sensitive species of wildlife will be considered in forest management activities. The formerly threatened Bald Eagle is still protected by the Bald and Golden Eagle Protection Act and no active management may be conducted within 660 feet of active nests during the nesting period. Although not threatened or endangered, certain rare bats, such as the Rafinesque and southeastern myotis, likely use the refuge for summer brood rearing habitat. In the summer months, the bats use trees with hollows or with exfoliating bark exposed to sunlight. Treatments should be arranged to retain sufficient amounts of hollow trees and trees with exfoliating bark. Additionally, there is one known rare plant species that occurs on the refuge, the water spider orchid (*Habenaria repens*). This species occurs in wet or marshy areas on the east side of the main levee between the old and the new levees. The main threat to the water spider orchid appears to be a lack of constant water, which allows for competition from other plant species.

Strategies:

- Maintain a permanent forest inventory system, such as the CFI, and develop tools (e.g., stand/stocking Inventories, GIS, and satellite imagery) to analyze and track habitat and site conditions over time, and to aid in determining the need for silvicultural actions and appropriate treatments to be prescribed.

- Develop and implement AHWPs and conduct forest management actions designed to improve stratification, develop lower vegetation layers, and regenerate shade-intolerant species.
- Through forest management actions, strive to encourage:
  - development of super-dominant trees (i.e., rising above the predominant forest canopy);
  - forest species diversity and forest health;
  - retention of stand cavity trees (large and small diameters);
  - tree species within a stand characterized by exfoliating bark exposed to sunlight.
- Within forest and reforested sites, determine the feasibility of establishing one to two greentree reservoirs that could be suitably managed to provide inundated winter habitats for waterfowl, and reliably dewatered in the spring to avoid tree stress and mortality.
  - Analyze topographic features and forest stand composition to assess the capability of easily flooding greentree reservoirs by the use of simple structures.
  - If greentree reservoirs are established, strive to mimic more natural wet/dry periods over time to ensure sustained tree vigor and viability of mast-producing tree species.
- Use afforestation or reforestation, where appropriate, to establish healthy bottomland hardwood forest on existing lands and new acquisitions for the benefit of priority bird species and other species of native wildlife.
- Coordinate with a local university or other organization to conduct a botanical survey and identify unique habitats on the refuge.
- Administer the forest management program in compliance with 50 CFR 29.1.

Wapanocca NWR Objective 2-3: Cropland Habitat Management

Adapt the cropland habitat management program to better achieve the refuge purpose and satisfy the needs of wintering waterfowl and other migratory birds by maintaining cooperative farming, but converting under-utilized croplands to managed grasslands.

Discussion: Wapanocca NWR was established to provide a wintering area for migratory waterfowl, a nesting and brooding area for wood ducks, and serve as a link in the chain of refuges along the Mississippi River, to encourage the southward migration of Canada Geese. Cooperative farming is a vital tool for providing a desirable balance of waterfowl habitat types in fulfillment of the refuge purpose. The high-energy cereal grain crops, left as the refuge's share of the cooperative farming program, artificially fill a void left by the loss of acorn-producing bottomland hardwood stands that once made up the majority of the habitats in the surrounding area. When these hardwood stands were cleared for farmland in the mid-1900s, a major component of the diet of wintering waterfowl was lost. The cereal grain crops planted within the refuge's farming program assist in substituting for that natural food component during the harsh winter months when a high-energy diet is critically needed.

In 1984, an objective of 1,200,000 Canada Goose Use Days was established by the LMVJV for Wapanocca NWR and management of the refuge's cooperative farming program has since worked toward accomplishing that goal. However, the full utilization of crops grown for Canada Geese has only occurred in 3 years in the history of the refuge. Wapanocca NWR has not witnessed large numbers of Canada Geese in recent years, and the 52 acres of unharvested corn and 117 acres of winter wheat that have been the established minimum requirements to meet these goals have been severely under-utilized by wintering waterfowl. In 2008, unharvested milo (65 acres) and winter wheat (17 acres) also were under-utilized by Canada Geese. It is the professional judgment of the refuge manager and biologists with the Service's Division of Migratory Birds that the refuge's cropland habitat management program should allow for more flexibility and diversification, in order to benefit a

wider array of migratory bird species and other native wildlife that inhabit the refuge. In short, the cropland management program should be more adaptive to current trends in waterfowl use, while still remaining true to the overall refuge purpose.

In recent years, wintering Snow Goose populations in the Mississippi Flyway have continued to increase. Refuge staff should remain aware of these increasing trends and alter the cropland management program to either encourage or discourage use of these birds, depending on the necessary management emphasis within the flyway for waterfowl and migratory birds in general.

The soil and topography of the refuge farm units on Wapanocca NWR are somewhat diversified. The soil ranges from mild clays in the lower areas to slightly to extremely sandy loams on the upper hills. Historically, these lands provided a great diversity of plant life within a relatively small area, ranging from swampy bottoms to hardwood stands, to even grasslands on the sandy ridges. In order to maintain this biological integrity and achieve the purposes of Wapanocca NWR, it is necessary to keep in mind this historical diversity and ensure that the cooperative farming program fulfills the proper role in providing the habitats necessary to serve the needs of wintering waterfowl, migratory birds, and other native wildlife.

The majority of the refuge's 288 acres of moist-soil habitats also should be included within the refuge's share of the farming program on a rotational basis as needed in order to set back plant succession, control invasive plant species, and stimulate growth of native, moist-soil vegetation. Although these native plants do not provide the high-energy of cereal grain crops, they are nutritionally complete and vital to the overall nutritional health of wintering waterfowl.

Cooperative farming on Wapanocca NWR will continue to create the most beneficial foraging habitats on croplands currently used by wintering waterfowl and other migratory birds until such time that resources allow for comparable management operations to be performed by refuge staff through force account farming.

Strategies:

- Continue to use cooperative farming on a 75:25 crop-share basis on 498 acres of existing agricultural lands on Wapanocca NWR as a vital tool to maintain overall health and diversity of refuge habitats and provide critical foraging habitats for waterfowl, shorebirds, and other migratory birds and native wildlife.
- Due to extended trends of low populations of wintering Canada Geese on Wapanocca NWR, convert up to 263 acres of the current 761 acres of cropland to grassland habitat. These acres will include the higher elevation sandy ridges spread throughout the farm acreage that prior to European settlement, consisted of native grassland habitat. If numbers of wintering Canada Geese return to their former levels, these acres will be recycled back into the farm program for use as winter browse habitat. Implement the transition to grassland habitat over a period of 3 to 5 years, beginning in the 2010 farm year.
- Incorporate up to 160 acres of moist-soil units into the refuge's 25 percent share of the crops as necessary to assist in control of invasive vegetation, set back woody encroachment, and allow cultivation of crops in the moist-soil units to increase the supply of hot foods available to wintering waterfowl.

- Monitor vegetation responses to habitat management practices and associated waterfowl use throughout the refuge, as well as shifting trends in migratory bird use within the Mississippi Flyway, and adapt management of the cropland programs as conditions warrant to ensure that the purposes of Wapanocca NWR are achieved and the refuge can fulfill its necessary role within the context of the Mississippi Flyway.
- Modify existing landscape structure within all farm units by creating a mosaic of smaller crop fields, grasslands, intensively managed moist-soil units, hedgerows and buffer strips, and reforested old-field habitats to provide a diversity of habitats similar to what existed on these lands historically, while keeping refuge goals for waterfowl and other migratory birds as a top priority.
- Maintain, if feasible and desirable, up to approximately 30 acres of sunflowers or milo as part of the refuge's 25 percent crop share to provide forage for Mourning Doves and other migratory birds and to provide increased opportunities for youth hunting.
- Administer the cooperative farming program in compliance with 50 CFR 29.1.

Wapanocca NWR Objective 2-4: Habitat Investigations, Inventorying, and Monitoring

Improve and expand investigations, inventories, and monitoring of the Refuge's flora and habitats and prepare and implement an Inventory and Monitoring Plan (IMP).

Discussion: The Improvement Act formally establishes the necessity of monitoring the status and trends of fish, wildlife, and plants on national wildlife refuges. Fish and Wildlife Service policy is to collect baseline information on key plants, fish, and wildlife to monitor, as resources permit, critical parameters and trends of selected species and species groups on and around Service units, and to base management on biologically and statistically sound data derived from such inventorying and monitoring (701 FW 2, Inventorying and Monitoring of Populations).

Monitoring, inventorying, and surveying (MIS) are very important means for scientifically managing trust wildlife populations and habitat, as well as meeting national, regional, and refuge goals. Before any MIS is started, the surveyor should seriously and honestly determine if: (1) Objectives, which are clear, specific, and measurable, are defined and can be practically met; (2) the results will actually be used to benefit the resource or make informed decisions; (3) quality and quantity of data needed to meet the objectives can be collected; (4) the MIS methodology is scientifically and statistically sound; (5) the costs of conducting the MIS are worth the results; (6) resources are available or will become available to complete the MIS; (7) the method of data analysis is pre-determined; and (8) MIS is prioritized so if resources become limited, then more critical MIS will be conducted.

Adaptive management is a system used by refuge managers to improve results by documenting management actions, measuring and documenting biological responses, and adapting (modifying) management actions to improve desired conditions/outcomes and determine if objectives have been met. Baseline inventorying and monitoring at regular intervals provide data essential for informed decision-making by refuge managers. Appropriate inventories and pre- and post-treatment monitoring of refuge habitats are fundamental for adaptive management. Inventorying and monitoring needs can often be met with the assistance of other Service programs and cooperative efforts with state resource agencies, universities, and USGS. Proper attention must be given to experimental and monitoring design, statistical procedure, and consistency in observation and data collection.

Management of moist-soil sites in particular requires intensive monitoring throughout critical establishment and manipulation periods to determine whether growth and availability of waterfowl or shorebird foods are sufficient to meet habitat goals. While water gauges in each impoundment allow detailed records on water levels, data on soil moisture, plant germination, and composition also will be required to successfully manage moist-soil areas.

Strategies:

- Prepare and implement an Inventorying and Monitoring Plan in accordance with Service guidelines.
- Utilize satellite imagery, aerial photos, and GIS mapping to depict refuge environmental and habitat changes over time.
- Coordinate with USGS, universities, COE, or others (e.g., Ducks Unlimited) to obtain sufficient Global Positioning System equipment to establish elevation points and topographic lines throughout the refuge to be used for hydrologic management purposes.
- Coordinate with a university or other appropriate source to conduct an in-depth botanical survey.
- Obtain historic aerial and photographic records of refuge flooding and use the data to map acreages inundated and correlate with COE gauge readings within the basin area.
- Investigate historical water regimes and system-wide hydrologic cycles of the refuge's watershed, and compile and analyze all water quality data collected for the refuge.
- Utilize a geomorphologist and/or other trained specialist to gain better information on the physical attributes of the surrounding watershed and the management implications for the refuge.
- Coordinate with COE, USGS, and state agencies to establish a long-term system for monitoring water quality parameters on the refuge and measuring concentrations of contaminants in waters, sediments, fish, and aquatic invertebrates.
- Use data collected in strategies described above to develop and implement a water and habitat management plan for Wapanocca Lake, designed to maximize benefits to waterfowl and shorebirds.
- Continue monitoring forest conditions on the refuge, using forest inventory procedures such as Continuous Forest Inventory (CFI) plots to establish current forest conditions and monitor forest changes over time.

RESOURCE PROTECTION

Wapanocca NWR Goal 3: Promote communication, cooperation, and partnerships between local, state, and federal agencies, land managers, and private citizens to minimize impacts from external habitat degradation and other threats to the functions and values of the refuge's associated wetland ecosystems and watersheds.

Discussion: In order to achieve the purpose of Wapanocca NWR, a number of issues that threaten to degrade or diminish the value of its resources must be addressed. These threats include invasive plant and animal species, water quality and contaminant issues, and siltation.

Essentially the entire surrounding landscape is privately owned, consisting primarily of tens of thousands of acres in crops, such as cotton, corn, soybeans, rice, milo, and wheat. Thus, high concentrations of herbicides and insecticides are often found within waters outside the refuge boundary, although USDA programs and other environmental partnerships attempt to reduce such adverse impacts. Like most refuges, Wapanocca NWR also faces an increasing threat posed by invasive plant and animal species.

Wapanocca NWR Objective 3-1: Water Management

Ensure the long-term environmental health of Wapanocca NWR, with an emphasis on water management in the Wapanocca Lake system.

Discussion: Rainfall is now the main source of water for Wapanocca Lake. However, there is not enough water to flush nutrients out of the lake or to more closely simulate the periodic water regimes most conducive to perpetuating a diverse bottomland forest and adjacent cypress/willow swamp habitats.

Strategies:

- Emphasize the priority of managing Wapanocca Lake water levels, vegetation, and lake conditions to provide critical waterfowl habitat versus sustained high lake levels for fishing (at the expense of waterfowl).
- Initiate innovative actions and partnerships to improve water inflow and outflow sources that will benefit the Wapanocca Lake system by creating a flushing mechanism for the lake to sustain better water quality conditions through actions such as:
  - Coordinating with the COE to explore options to obtain land and waters within the Wapanocca Lake watershed to help provide inflow and outflow potentials for Wapanocca Lake;
  - Implementing a minor boundary expansion (669 acres) for the refuge to include the entire course of Wapanocca Bayou to enable the purchase of lands along the bayou from willing sellers and provide a connection between Wapanocca Lake and the Mississippi River;
  - Determining the feasibility of constructing a structure through or over the Mississippi River levee (to enable use of backwaters diverted through a pipeline then via Drainage Ditch #8 or through Wapanocca Bayou);
  - Initiating a contaminants study as soon as resources are available to sample waters inside and outside the refuge to ensure that water restored to the refuge and lake system is of high quality and not contaminated.
- Maintain desired water levels in Wapanocca Lake utilizing, as practical and feasible, refuge wells, rainfall, and pumping of uncontaminated watershed waters.
- Develop and implement a water management plan that results in a hydrologic regime that emulates historic hydrological cycles within the watershed and provides optimum water levels and associated vegetative communities for waterfowl, shorebirds, and other migratory birds by:
  - Utilizing historical data on water levels collected for the nearby Mississippi River and St. Francis River, and recorded by USGS and COE to identify and simulate natural water level fluctuations;
  - Establishing accurate water gauges at key sites within the lake to collect accurate water level data and long-term records.
- Recruit a hydrologist based at Big Lake NWR (but serving all refuges in the Complex) to coordinate with COE on water management programs, sedimentation, and flood control issues, and to coordinate research, assessments, and monitoring of aquatic habitats and water systems.

Wapanocca NWR Objective 3-2: Watershed Outreach

Perform outreach to basin/watershed landowners to encourage conservation actions that are beneficial to wildlife and improved water quality.

Discussion: Land use, actions, and projects by upstream landowners and developers in the watershed impact hydrology, water quantity, and water quality in ways that can affect refuge interests and resources. The USDA's Conservation Security Program (CSP) supports ongoing stewardship of private agricultural lands by providing payments and technical assistance for maintaining and enhancing natural resources on these private lands.

Strategies:

- Coordinate with NRCS to prioritize lands surrounding the refuge for inclusion in USDA programs, such as the CSP.
- Utilize the Service's Partners for Fish and Wildlife Program to partner with adjacent private landowners to restore hydrology, improve water quality, and restore wildlife habitats.
- Recruit a hydrologist to be stationed at Big Lake NWR but also to serve Wapanocca NWR and other refuges within the Complex to coordinate water management and aquatic habitat research, monitoring and restoration programs, and to perform outreach to adjacent landowners regarding water quality programs

Wapanocca NWR Objective 3-3: Invasive Plant and Nuisance Animal Control

Identify problem locations and situations caused by non-native, invasive, and injurious animals and plants, and implement appropriate control measures to protect refuge wildlife, habitat, and infrastructure.

Discussion: Invasive species are typically, but not always, non-native species of plants and animals that aggressively proliferate and spread into new habitats, where they degrade native ecosystems, and damage, displace, or compete with indigenous flora and fauna. Examples of animals and plants with the potential to cause environmental problems at Wapanocca NWR are swine (feral hogs), beaver, nutria, Chinese privet, and American lotus.

Strategies:

- Implement invasive species prevention and control programs in compliance with 50 CFR 29.1 and EO 13112.
- Continue to assess the coverage of cutgrass and American lotus in the lake and implement mechanical, chemical, or water level manipulation actions as warranted to control these species. Initiate control efforts when lotus covers more than 30 percent of the lake surface.
- Search for and control or remove, through chemical or mechanical methods, invasive upland plant species (e.g., privet, fescue, sericea lespedeza, and saw tooth oak) before major infestations occur.
- Control beaver, muskrat, and nutria populations to protect levees and water control structures from damage from burrowing and forested tracts from excessive tree-felling and flooding during the growing season.
- Develop and implement control efforts and public outreach to control feral hogs and the illegal introduction of domestic swine.
- If necessary, implement appropriate and compatible practices, such as trapping by permitted individuals or commercial trapping by the public, to maintain healthy populations of furbearers at levels consistent with refuge objectives, prevent/control disease outbreaks, and reduce excessive predation on priority species.

Wapanocca NWR Objective 3-4: Land Acquisition

Acquire priority lands within or adjacent to the acquisition boundary from willing sellers that would enhance the wildlife and habitat value of the refuge and promote fulfillment of the purpose of the refuge.

Discussion: The current acquisition boundary for the refuge encompasses 6,689 acres. Unfortunately, the acquisition boundary does not include any of Wapanocca Bayou, which is vital to efforts conceived by the refuge and COE to reestablish the historical connection between the Mississippi River and Wapanocca Lake via Wapanocca Bayou. The COE has already purchased a 169-acre property for mitigation that they are in the process of transferring to the Service for inclusion in Wapanocca NWR. Wapanocca Bayou runs directly through the center of this parcel with the property boundaries paralleling the bayou to the north and south. This property will provide the beginning of the habitat corridor along Wapanocca Bayou that will be necessary to re-establish the historical connection between the Mississippi River and Wapanocca Lake, so that the lake could be supplied with water from its historical source and allow ongoing lake restoration efforts previously undertaken by the refuge, and those about to be funded under ARRA, to finally be complete and self-perpetuating. To accomplish this strategic landscape conservation goal, the existing acquisition boundary would need to be extended to encompass the length of Wapanocca Bayou. Purchase of this corridor from willing sellers would allow the desired backwater flooding to occur from the Mississippi River into Wapanocca Bayou and finally into Wapanocca Lake without flooding existing private agricultural interests bordering the bayou.

From the strategic landscape conservation perspective, a 10,000-acre forested block with the current acreage of Wapanocca NWR at the center would be recommended to optimize benefits for migratory birds and other trust species. Numerous private farmlands adjacent to the refuge, as well as forested lands along Wapanocca NWR's northwest corner near Turrell, would be primary sites to consider for land acquisition from willing sellers, to enable a major boundary expansion for the refuge.

Strategies:

- Pursue a minor boundary expansion (669 acres) that includes the entire course of Wapanocca Bayou between the existing refuge boundary and the Mississippi River. Partner with COE to acquire in fee and via easements, from willing sellers, those lands in and around the old Wapanocca Bayou to provide a channel to the Mississippi River that would enable recharging of Wapanocca Lake with flood waters from the Mississippi River.
- Utilize land acquisitions and easements, from willing sellers, to create greater opportunities for enhanced water delivery from several external sources to increase sources of water supply to the refuge, and improve water delivery capability within and among refuge impoundments and other managed areas.
- Reduce contaminant sources into the refuge.
- Evaluate appropriateness and feasibility of expanding Wapanocca NWR's area to at least 10,000 acres through a major boundary expansion, acquisition of additional lands from willing sellers, and forest and hydrologic restoration to optimize benefits for interior forest birds and other trust species, in addition to reconnecting Wapanocca Lake to the Mississippi River via Wapanocca Bayou.

Wapanocca NWR Objective 3-5: Cultural Resources

Develop and implement a Cultural Resources Management Plan.

Discussion: Refuge management will protect cultural resources on the refuge in accordance with federal and state historic preservation laws and regulations.

Strategies:

- Prepare a Cultural Resources Management Plan (CRMP) for the refuge.
- As guided by the CRMP:
  - Conduct a Phase I archaeological survey of the non-flooded areas of the refuge by qualified personnel as a necessary first step in cultural resources management;
  - Conduct a Phase II investigation if archaeological resources are identified during the Phase I survey, to determine the eligibility of identified resources for listing on the National Register of Historic Places prior to any disturbance;
  - Conduct a Phase III data recovery if the resources identified in Phases I and II are determined to be eligible in order to recover data and mitigate the adverse effects of any undertaking;
  - Follow procedures detailed in the CRMP for inadvertent discoveries of human remains;
  - Ensure archaeological and cultural values are described, identified, and taken into consideration prior to implementing undertakings.
- Follow procedures outlined in the CRMP for consultation with the Service's Regional Historic Preservation Office, the State Historic Preservation Office, and potentially interested American Indian tribes.
- Develop a step-down plan for surveying lands to identify archaeological resources and for developing a preservation program.

VISITOR SERVICES

Wapanocca Goal 4: Develop compatible, wildlife-dependent recreation programs that lead to enjoyable experiences; a greater understanding of fish, wildlife, and habitat conservation; and a greater appreciation for the value of Wapanocca NWR.

Discussion: Wapanocca NWR provides each of the wildlife-dependent activities identified in the Improvement Act as priority public uses of national wildlife refuges. These are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The primary public uses of the refuge are hunting, fishing, and wildlife observation.

Drought and record low water levels have resulted in depletion of water in Wapanocca Lake and a decrease in migratory bird use. Other than rainfall, there is no other source of water to replenish the lake. Most public use is directly linked to the water levels in Wapanocca Lake. Without restoration, existing lake conditions will have serious consequences on the future of the public use program. Fishing and wildlife viewing would be the programs most affected by the low water levels. Adequate and reliable water level management to provide optimum habitat for waterfowl and other migratory birds must be developed. To fulfill refuge purposes, the emphasis on water level management in Wapanocca Lake must be shifted from maintaining water levels that maximize fishing opportunity to those that maximize benefits for wintering waterfowl and other wildlife. This will necessitate public outreach and education to promote visitor awareness for providing waterfowl habitat in the context of the surrounding landscape. The associated public use benefits will include increased opportunity for wildlife observation and photography, environmental education, and interpretation on the refuge. Additionally, increased levels of waterfowl use on the refuge, if they can be achieved, will result in increased off-refuge hunting opportunities on surrounding lands.

Wapanocca NWR 4-1: Visitor Services Plan and Public Use Management

Promote and manage appropriate and compatible public uses, and prepare and implement a Visitor Services Plan.

Discussion: Careful planning and management of public use and visitor services provides the public with opportunities to enjoy and appreciate fish, wildlife, plants, and other resources. As a result, the visiting public will develop an understanding and an appreciation of each individual's role in environmental conservation. An up-to-date visitor services plan does not exist for Wapanocca NWR. All existing visitor services activities occurring on the refuge have been evaluated for appropriateness. All activities have also been determined to be one of the six priority public uses, to support one of the priority public uses, or otherwise support goals and objectives of the refuge and mission of the Refuge System. All public use activities are compatible with refuge purposes, goals, and objectives.

No visitor services staff exists on Wapanocca or Big Lake NWRs or the Complex. Existing staff have neither the expertise nor the time to devote to expanded public use on the refuge. A park ranger (Visitor Services specialist) must be recruited (stationed at Wapanocca NWR but also serving Big Lake NWR) to develop and implement a visitor services plan as part of a comprehensive visitor services program for Wapanocca and Big Lake NWRs. Additional responsibilities would include expanding the volunteer and intern programs and coordinating the establishment of Friends Groups. Environmental education and outreach programs would be implemented that would promote the refuges and help connect over 1,000,000 residents with nature. Development of an on-site interpretive program would involve updating and/or creating various printed materials, such as brochures and bird, reptile, and amphibian lists. The Visitor Services specialist also would coordinate planning and development of public use facilities, kiosks, information stations, nature trails, and observational towers and blinds.

Strategies:

- Monitor, evaluate, and modify, as necessary, all public uses to ensure compatibility and to minimize conflicts between user groups; re-evaluate compatibility determinations as necessary.
- As soon as funding becomes available, recruit a park ranger (Visitor Services specialist), to be stationed at Wapanocca NWR, to develop and coordinate a comprehensive visitor services program for Wapanocca and Big Lake NWRs.
- Develop and implement a Visitor Services Plan (with public and partner involvement) that addresses the current and future recreational needs of refuge visitors and associated visitor services, and reflects applicable legislation, Service, and Refuge System missions, directives, and policies, and supports refuge goals and objectives.
- The plan also will specify programs for each type of public use, propose new facilities, address maintenance, upkeep, replacement, and/or elimination of current facilities, and identify a prospective timeline for implementation.
- Maintain prohibition on camping, horseback use, and ATV access within the refuge.
- Mobility-impaired hunters may apply for a special use permit allowing specialized access by ATV.

Wapanocca NWR Objective 4-2: Visitor Welcome and Orientation

Implement visitor welcoming and orientation recommendations of the Wapanocca NWR Visitor Services Review Report according to the staggered timeframe (now, intermediate, and long-term) outlined in that document.

Discussion: The refuge has a visitor center that is periodically open. Visitor hours are posted on the website and at the visitor center. The entrance sign in front of the refuge headquarters and visitor center is well-maintained, properly located, and consistent with Service policy. A 3-panel kiosk contains a refuge map and current refuge publications. This kiosk is triangular in shape and visitors must get out of their vehicle or be on foot to view all three panels. Most of the information on the kiosk is current. The kiosk can be accessed after hours but is not universally accessible.

The current refuge headquarters/visitor contact station at Wapanocca NWR is a substandard facility with major structural problems, exterior and interior water and rot damage, and health and safety problems that render it unsuitable for visitor reception and use, or any type of environmental education and interpretive activities. Furthermore, the building is not fully accessible at the entrance or inside, and it does not have design features (such as proper exit points) that comply with health and safty codes. Funding has been obtained through the American Reinvestment and Recovery Act (ARRA) for replacement of the existing headquarters/visitor contact station with a suitable facility to allow for efficient management of public use and administration of a visitor services program, including opportunities for environmental education and interpretation. The proposed headquarters/visitor contact station would be 1-story, approximately 2,500 square feet in size, would be fully ADA-compliant, and would include a volunteer/receptionist area, exhibit area, conference room, breakroom, law enforcement storage, public restrooms, staff offices, and public parking. This facility would be constructed on the same site as the current building, thereby minimizing site disturbance and habitat loss, and would incorporate energy and resource conserving features to reduce environmental impacts.

The refuge visitor center has a 16 mm film on the history of the refuge. Refuge regulations are listed on signs and published in refuge pamphlets (brochures) available at the visitor center. However, it is not clear to visitors where they can go or whom they can contact to ask regulatory questions or to report problems or violations. Although the general brochures need to be revised and updated, they do contain basic refuge background and resource management information, basic regulations, and descriptions of allowed visitor services activities.

Refuge boundaries are properly marked and maintained. However, directional signs are needed at some refuge road intersections. A directional sign for Wapanocca NWR is also needed on Interstate 55.

Strategies:

- Replace the existing refuge office at the same location with a 2,500-square-foot headquarters/visitor contact station, using ARRA funding (approximately $650,000) and incorporating green-building design features to provide adequate facilities to meet the expectations and needs of the visiting public, to conduct visitor services programs, to facilitate work with partners, and to enable refuge staff to administer public use programs and associated operations.

Implement now

- Close spur road at end of Woody Pond to vehicular traffic.
- Update, improve, and add signage at the headquarters, entrance areas, and all the decision points on the Wildlife Drive to provide visitors with adequate information on visitor services, regulations, safety information, routes of travel, distances to visitor destinations on the refuge, and points of interest.
- Ensure that refuge brochures, maps, and other visitor services products are up-to-date and readily available to the public.
- Continue to leave the visitor contact area of the visitor center open when staff are not available during business hours.
- Adequately protect, maintain, and replace visitor exhibits as conditions warrant and funds are available.

Implement over the intermediate future

- Install an audio transmission message device in the entrance area to the headquarters that provides current status information on the lake and seasonal visitor use opportunities on the refuge.
- Replace refuge sign at the headquarters entrance.
- Update the panels on the kiosk at the headquarters/visitor center, providing basic welcoming and orientation information, including the purpose of refuge, permitted/prohibited activities, and information about the lake.
- Repair and rehabilitate office and visitor center (unless cost effectiveness indicates new construction, in which case pursue funding for replacing headquarters and visitor center) to make it more appealing and presentable to visitors (see first strategy above). Promote work productivity, and ensure compliance with the Americans with Disabilities Act (ADA), safety, and environmental regulations.
- Recruit and train staff/volunteers to provide receptionist/welcoming and orientation services to visitors.
- Develop an interpretive panel about the restoration efforts for Wapanocca Lake. Emphasize the value of partnerships, the need to reconnect the lake with a water source, and the need to prioritize managing lake water levels for the benefit of waterfowl.

Implement over the long-term future

- Work with AHTD to install a sign on I-55 directing visitors to the Refuge.
- Replace exhibits in the visitor center.
- Enlist and train volunteers to staff the visitor center area.
- Convert the refuge film to DVD format or have a new DVD produced when funds are available.
- Replace the visitor center kiosk with a 3-panel, u-shaped kiosk and relocate it to the median of the parking area.
- Update the refuge Bird List.

Wapanocca NWR Objective 4-3: Hunting

Provide and expand quality, compatible hunting opportunities as feasible and desirable.

Discussion: Biologically sound hunting is a legitimate activity on a national wildlife refuge and is one of the six priority public uses identified in the Improvement Act to be given enhanced consideration over other public uses if compatible with the refuge purpose.

Wapanocca NWR is open to the public for hunting. Access is allowed via walking, bicycle, and motor vehicle. All vehicles, including bicycles, are restricted to designated roads and parking areas. ATVs and horses/mules are prohibited. Public access to hunt areas may be closed at any time necessary to protect refuge resources or visitors. Hunters are allowed to hunt anywhere not posted as "Area Beyond This Sign Closed." Wapanocca NWR has a current and approved hunting plan, which will be revised and updated after the CCP. The current hunt plan addresses special access by permit for hunters with disabilities. All hunting programs are conducted in accordance with the AGFC season and limits, but the refuge has a shorter season than the AGFC for small game, furbearer, and deer. Federal and state regulations are made available to hunters at headquarters and kiosks. Dogs are allowed for squirrel and rabbit hunting and required for raccoon and opossum hunting at night. Horses/mules are prohibited.

There is one full-time Complex refuge law enforcement officer and some assistance is provided from AGFC officers and the County Sheriff's Department. Generally, law enforcement is inadequate for the number of visitors, especially hunters, using the refuge.

A hunt brochure is produced annually in accordance with Service Graphics Standards. No accessible alternatives exist for visitors with visual disabilities to obtain hunting information.

Wapanocca NWR is currently closed to waterfowl hunting except for Snow Goose hunting under the State Conservation Order. Hunting of squirrel, rabbit, raccoon, and opossum is allowed on the refuge but under a shorter season than the AGFC regulations. Trapping is prohibited. Archery deer hunting is permitted on the refuge and is open October 1 – January 31. The quota deer gun hunt is conducted by a lottery drawing to control the number of hunters and is a 2-day, weekend hunt held the opening weekend of the state-wide deer season. The harvest information from the quota deer hunt is obtained from the refuge check station. Managers review the deer harvest to make decisions regarding the deer hunting season and share these data with AGFC.

Strategies:

- As soon as resources are available, recruit a park ranger (law enforcement) to be stationed on Big Lake NWR, to provide visitor and resource protection and perform outreach on Wapanocca and Big Lake NWRs.
- Develop and implement a revised hunt plan following approval of the CCP.
- Explicitly inform (e.g., placing a prominent sign at start of wildlife drive) the public that the refuge is closed to all public entry and use during the quota gun hunt except for quota permit holders.
- Continue to coordinate with AGFC biologists to formulate hunting seasons that will follow existing AGFC regulations, but with additional refuge limitations or restrictions as needed.
- Limit raccoon hunting to the November 1 – 30 season.
- Continue to allow Snow Goose hunting under the State Conservation Order after the waterfowl sanctuary closure ends (February 28), but such hunting will be allowed only north of Ditch 8.
- Implement measures such as quotas, permits, and period limitations as needed, and, if necessary, establish no hunting zones around public use facilities, trails, and refuge buildings to maintain safety, hunt quality, and minimize conflicts.
- As feasible and desirable, implement youth hunts to provide additional hunting opportunities.
- Continue to provide waterfowl sanctuary areas to fulfill refuge purposes.

- Limit or discontinue night hunting activities during key waterfowl use periods, as necessary.
- Determine if quail and woodcock hunting, using bird dog breeds, would be desirable and compatible.
- Consider increasing the length of resident small game seasons, if desirable and compatible and, if so, implement such hunts.
- Coordinate with the Service's recreation fee coordinator on a master list of approved sites to collect fees as part of the recreation fee program.
- Mobility-impaired hunters may apply for a special use permit, allowing specialized access by ATV.

Wapanocca NWR Objective 4-4: Fishing

Provide and expand quality, compatible fishing opportunities as feasible and desirable.

Discussion: Fishing is a priority public use of the Refuge System, when compatible. Although fishing is a compatible public use that has been an important visitor activity at Wapanocca NWR, in 2004 the refuge was closed to fishing due to the low water conditions on the lake following restoration efforts. It reopened on March 15, 2008; however, water levels have been insufficient to re-establish a viable fishing program.

Fishing is allowed from March 15 - October 31 annually in Wapanocca Lake and Woody Pond. A fishing permit is not required. Big Creek and other ditches are closed to fishing. Taking of crawdads (crawfish) for personal use is also permitted. However, the refuge is closed to the taking of frogs, turtles, and mollusks. Commercial guiding for fishing is not permitted on the refuge. Commercial fishing, when allowed, will require a special use permit. Bank fishing is limited to one location, the wildlife observation platform, located off the wildlife drive. Access is by walking, motor vehicle, bicycle, boat, canoe, and kayak. All vehicles, including ATVs and bicycles, are restricted to designated roads and parking areas. ATVs, personal watercraft (e.g., jet skis, hovercraft), airboat, and horses/mules are prohibited. There is one public boat launch located off Highway 77. User conflicts between anglers and other visitors have not been a problem; therefore, angler numbers are not controlled.

In the heyday of the fishing program, there was enough interest in fishing to support a boat rental concessionaire. Those days are past due to the decline in lake quality and fishing opportunity. Due to the proximity of the refuge to the Memphis metropolitan area, there is great potential for recreational fishing. However, in order to best fulfill refuge purposes, managing Wapanocca Lake for fishing must be secondary to managing for maximum ideal waterfowl and other migratory bird habitat. Even if the refuge develops the capacity and capability to reliably deliver and manage water in the lake, water level management still must be directed toward the goal of providing high-quality waterfowl habitat first and foremost, compared to other benefits, such as fishing. Compatible fishing opportunities will be developed as much as possible within the context of management for waterfowl and other trust species.

Coordination of the fishing program has been conducted with the assistance of AGFC and the Service's Fisheries Office in Baton Rouge, Louisiana. Routine compliance checks and patrol of fishing areas is conducted by federal and state law enforcement officers. However, there are no full-time or collateral duty law enforcement officers stationed at Wapanocca NWR. Therefore, routine law enforcement patrols and compliance checks are limited. No data have been collected on species, numbers taken, or residency of anglers. Similarly, no data are available on contaminant levels in fish caught on the refuge.

Strategies:

- Improve enforcement of refuge fishing regulations by recruiting a park ranger (law enforcement) officer that would serve Big Lake and Wapanocca NWRs.
- Improve habitat quality of Wapanocca Lake to enhance fisheries and improve fishing success, but not at the expense of high-quality waterfowl habitat. Implement the following practices:
  - Lower lake levels periodically to allow improvement of aquatic habitats as warranted based on review of plant invasions, fish samples, and water quality data;
  - Strive to supply high-quality freshwater to refuge aquatic habitats from wells, diversion canals, and/or use of Mississippi River back waters (needed for flushing, reducing stagnation, redistributing fish, and maintaining water levels);
  - Increase Wapanocca Lake summer water depth levels as warranted without impacting bottomland hardwoods and moist-soil production in the cypress openings, or otherwise diminishing waterfowl habitat management capabilities;
  - Consider and evaluate the necessity and potential impacts to aquatic habitat by holding water at a high level in Wapanocca Lake (perhaps to late May) every 3 to 4 years to facilitate natural reproduction of fisheries and improve the quality of fishing.
- Allow bow fishing (on line) in refuge waters according to AGFC regulations, where/when feasible and desirable.
- Monitor contaminant levels in fish with regard to their safety for human consumption and post advisories if warranted.
- Minimize disturbance impacts to migratory birds through the use of area/time closures for boating, fishing, commercial fishing, and other public use activities on Wapanocca Lake from November to March.

Wapanocca NWR Objective 4-5: Wildlife Observation and Photography

Provide and expand quality, compatible wildlife observation and photography opportunities as feasible and desirable.

Discussion: The refuge has a wildlife auto drive approximately 7 miles in length (one way). The road takes visitors from the headquarters/visitor center into the refuge, passes the observation and fishing pier, and ends at Woody Pond. The existing area used to turn around or park vehicles at the end of the wildlife auto drive is inadequate.

There are no interpretive or hiking trails on the refuge. An observation/fishing pier is located off the wildlife auto drive and offers a view of Wapanocca Lake. In years with adequate water levels, the lake has high concentrations of Canada Geese and other migrating waterfowl. In 2007-2008, the low lake levels offered only distant viewing of wading and shore birds. The pier requires overall maintenance and some railings need to be re-secured. The parking area is fully accessible, but there is no kiosk for visitor orientation and interpretation.

The current refuge bird list, updated in 2006, complies with the Service's Graphics Standard. The refuge general brochure, updated in 2002, provides a general map of the entire refuge but does not indicate distances for the wildlife drive.

Strategies:

- Repair the wildlife observation deck at Wapanocca Lake and install a spotting scope.
- Install a wildlife viewing marker at a location suitable for viewing the eagle nest.
- Provide (cut) viewing windows through the vegetation around Woody Pond to enhance wildlife observation/photography.
- Design and install a trail through the upland hardwoods that would lead to an observation deck to provide an overlook on Woody Pond, then plan and construct an observation deck when funds become available.
- Consider and evaluate the feasibility and desirability of planting a demonstration farm crop along the wildlife auto drive to use in interpreting "cooperative farming" and also resulting in additional opportunities for observing wildlife and photography.
- Consider and evaluate locations on the refuge to develop and install a hiking trail for wildlife observation/photography and implement if feasible and desirable.

Wapanocca NWR Objective 4-6: Environmental Education and Outreach

Provide and expand quality, compatible environmental education and outreach opportunities as feasible and desirable.

Discussion: The refuge currently has minimal environmental education offerings for school groups. Occasionally, staff will present a program to a community group, local schools, university class, wildlife club, or garden club. Facilities and sites are available at the refuge to support the environmental education program.

A negative attitude, including resentment because of federal ownership, has been expressed by some members of the community toward refuge-related issues. Conversely, considerable support for the refuge also exists. Some members of the community blame prior refuge management practices for the low water conditions of the lake. Additionally, the public may not fully understand the reasons behind the lake drawdown. A public outreach program should be implemented to educate visitors about the need for and benefits of managing lake levels foremost for waterfowl habitat in order to best achieve refuge purposes. The public should be informed about how this change in emphasis lake management will impact fishing, but will also benefit other recreation such as wildlife observation, photography, and environmental education.

Community decision-makers and leaders have been identified as stakeholders in refuge management. Hunters, anglers, and birders are perhaps most impacted by existing refuge-related priorities and preferred actions. State and national leaders, community leaders, conservation groups, stakeholders, special interest groups, and media have been included in the list of audiences.

Both Service and Refuge System messages are incorporated into the refuge's programs. They are communicated through outreach activities, such as when the refuge manager presents programs both on and off the refuge. The refuge uses news releases, web pages, and personal contacts to communicate outreach messages. The refuge would benefit from a portable exhibit to use in delivering effective messages. Articles in local newspapers and other media and personal contacts have been the primary methods used for outreach efforts. Additional staff are needed to expand outreach programs.

Strategies:

- Recruit a park ranger (Visitor Services specialist) to plan and implement a comprehensive environmental education program for Wapanocca and Big Lake NWRs.
- Coordinate with Regional Office visitor services staff to develop three education programs to present, as requested, on such topics as waterfowl, shorebirds, and reforestation, and to develop a program for training teachers in environmental education topics.
- Partner with a local college to apply for a Nature of Learning grant to assist in developing an environmental education program.
- Refuge staff should consider partnering with Boy Scout troops and serving as merit badge counselors for badges such as Bird Study, Environmental Science, Fish and Wildlife Management, Fishing, Forestry, and Mammal Study.
- Develop standard PowerPoint presentations that can be used to deliver outreach programs to community groups.
- Develop a refuge or Complex specific portable exhibit.
- Develop an outreach plan to address the lake restoration issue and future management priority for waterfowl habitat, and other issues of interest for refuge visitors and local communities.
- Recruit and train volunteers to assume select environmental education and outreach tasks on- and off-refuge as appropriate.
- Consider conducting a community open house with tours and possibly a cookout, in early November before the waterfowl sanctuary closes.
- Evaluate the desirability of the refuge joining a local Chamber of Commerce.
- Continue to develop and maintain good media contacts, and coordinate with reporters to highlight the refuge in local media outlets.
- Host an annual media day on the refuge.
- Host a congressional field day to highlight the importance of the lake restoration project and management for waterfowl and fishing (include all parties involved in the project), and to highlight other refuge management programs.
- Conduct an annual refuge event during National Wildlife Refuge Week.

Wapanocca NWR Objective 4-7: Interpretation

Provide and expand quality, compatible interpretation opportunities as feasible and desirable.

Discussion: There is information available about the refuge for the public at the kiosk located in the office parking lot. The office includes a small exhibit area with two dioramas, a habitat change exhibit, and a fish display. The general brochure provides information about management of the refuge, as well as public use opportunities.

Strategies:

- Install two temporary interpretive signs on the wildlife drive, which explain that water levels in the lake are well below historic levels and this condition will affect wildlife viewing and fishing opportunities. Install one such sign near the drive entrance before motorists commence the drive and a second sign near the wildlife observation platform.

- Consider the following locations and topics for installing permanent interpretive panels:
  Nature Drive – reforestation, farming for wildlife, moist-soil management, eagle nest, and Woody Pond habitat importance;
  Observation Deck – restoration of Wapanocca Lake;
  Visitor Center – cultural and natural history of the area, refuge history, and hydrology;
  Big Creek crossing on the Nature Drive – role of hydrology in the Wapanocca Lake watershed and why river cane is important to wildlife.
- Design and install an interpretive trail that starts and ends at the Visitor Center, if feasible and desirable.

REFUGE ADMINISTRATION

Wapanocca Goal 5: Provide support and resources necessary to ensure that goals and objectives for habitats, fish and wildlife management, resource protection, visitor services, and refuge administration are achieved for Wapanocca NWR in particular and Central Arkansas NWR Complex overall.

Discussion: Both the Biological Review and the Visitor Services Review teams specified additional staffing, equipment, and facilities needed to implement the refuge's purposes, vision, goals, and objectives identified in this Draft CCP.

Wapanocca NWR Objective 5-1: Staffing

As funding becomes available, strategically add staff that will improve the capacity and capability of Wapanocca NWR to achieve its legislated purpose and accomplish conservation and management goals and objectives.

Discussion: Current staffing consists of a refuge manager and engineering equipment operator. There is no Visitor Services specialist, law enforcement officer, biological staff, or administrative personnel.

Strategies:

- Upgrade current refuge manager position to appropriately reflect the true scope, complexity, and effect of the duties and responsibilities at Wapanocca NWR and within the Complex.
- Recruit a full-time park ranger (law enforcement) based at Big Lake NWR and shared with Wapanocca NWR to ensure adequate enforcement of public use regulations, provide essential resource and visitor protection, coordinate with state and local law enforcement personnel, and perform outreach.
- Recruit a park ranger (Visitor Services specialist), based at Wapanocca NWR and shared with Big Lake NWR, to develop and implement improved and expanded visitor services programs on Wapanocca and Big Lake NWRs.
- Recruit a biologist/biological technician to assist with wildlife and habitat inventorying and monitoring, implementation of habitat management projects, and to coordinate biological programs.
- Recruit an engineering equipment operator to implement habitat management projects, and maintain and rehabilitate facilities, infrastructure, and equipment.
- Recruit a laborer to assist with maintenance operations, habitat management projects, and servicing and upkeeping of facilities and equipment.

- Recruit a hydrologist to coordinate hydrological and water quality issues on all refuges within the Complex, coordinate hydrological research and monitoring, provide technical advice to adjacent landowners, serve as a liaison with COE, and coordinate aquatic restoration projects.

Wapanocca NWR Objective 5-2: Volunteers, Partners, and Friends

Expand the volunteer and intern program, establish a Friends Group for the refuge, and cooperate with partners to accomplish refuge goals and objectives.

Discussion: Staff should conduct a volunteer program needs assessment to determine how to best expand a volunteer program that would include volunteer position descriptions, a volunteer handbook, and volunteer coordinator responsibilities.

In the recent past, volunteers have been used to help with maintenance and bird counts. Volunteer position descriptions are not established that define duties and assignments. Volunteers are not actively recruited for the refuge. A training packet with Service, Refuge System, and refuge-specific information is not currently provided for volunteers. However, proper workspace, materials, and equipment are provided to the volunteers so that they can safely and properly do their jobs. Benefits are not provided to volunteers for uniforms and no on-site housing exists. The refuge does not have a Friends Group.

Strategies:

- Recruit a park ranger (Visitor Services specialist), based at Wapanocca NWR and shared with Big Lake NWR, to develop and coordinate the volunteer and Friends programs for both refuges.
- Develop a volunteer plan in coordination with the Regional Volunteer Coordinator that includes a volunteer program needs assessment.
- Identify specific volunteer opportunities and descriptions for roles that would be filled by volunteers, such as office help, staffing the front desk, maintenance, environmental education, and outreach assistance.
- Incorporate volunteer, interns, and Friends recruitment messages into public presentations and media outreach, and recruit volunteers from ranks of local teachers, students, retirement communities, and church groups.
- Adopt a volunteer recognition plan that includes awards for volunteering a certain number of hours.
- Consider the feasibility and desirability of providing housing or other facilities for resident volunteers and interns.
- Coordinate with universities in Arkansas and elsewhere to recruit high-quality interns to assist the refuge with operations, inventory, and management programs.
- Cooperate closely with staff from other government agencies, non-government organizations, and community groups to establish and nurture partnerships that would provide mutual benefits for those involved and help achieve refuge goals and objectives.
- Identify and facilitate a core group of individuals that are concerned with the interests and needs of the refuge, and coordinate with them to initiate and establish a Friends Group for Wapanocca NWR.
- The refuge manager and Visitor Services specialist should attend Friends Group training.

Wapanocca NWR Objective 5-3: Facilities, Infrastructure, and Equipment

Acquire and maintain all of the facilities, infrastructure, and equipment necessary to perform habitat management, restoration, and improvement on the refuge, in addition to maintaining and improving essential infrastructure such as roads and levees.

Discussion: The current refuge office/visitor contact station at Wapanocca NWR, approximately 1/4-mile south of Turrell, Arkansas, in Crittenden County, was constructed in the early 1980s and is substandard and inadequate to meet administrative and visitor services needs. Entry points, interior workspaces, and public areas, including restrooms, are not fully accessible. The exterior and interior walls are deteriorating and failing, the HVAC system is inefficient, a solar unit never functioned, offices are not sufficiently lighted or ventilated, and exterior siding and walkways are rotting and unstable. The roof is improperly designed and constructed and has been replaced twice, but has again failed and has caused water damage to interior ceilings, walls, floors, and exhibits. It has created serious mold issues. Additionally, other health and safety issues are evident, including insufficient public exits. Due to these problems, no suitable opportunities exist for staff/partners meetings, visitor reception, or exhibit areas for education/interpretation. The building is unsightly due to its condition and appearance. A condition assessment performed in March 2009, indicated that rehabilitation or renovations were not cost effective or desirable.

Funding has been obtained through the ARRA for replacement of the existing structure with a suitable facility. The proposed headquarters/visitor contact station would be 1-story, approximately 2,500 square feet in size, and will include four staff offices, conference room, break room, unisex staff restroom, law enforcement storage, utility/storage closets, fax/photocopy/file room, mudroom, separate male/female public restrooms, an exhibit area, and volunteer/receptionist area. This facility would be fully ADA-compliant, would provide adequate administrative function, and would enable suitable opportunities for visitor reception and interpretation. The building design would incorporate greening features, including energy-conserving lighting, HVAC, and insulation, water- conserving systems, and options for alternate energy. These features would reduce the carbon footprint also would provide a safe and comfortable environment for staff and visitors. The current building would be removed and the new headquarters/visitor contact station would be constructed in the same location; therefore, new construction would cause minimal site disturbance and no wildlife habitat would be destroyed. Existing entrance drives, parking areas, and approaches would be used. The funding amount for the project is approximately $650,000, which would include planning/design, engineering, construction, furniture, and interpretive exhibits.

Sharing equipment with Big Lake NWR and the Central Arkansas NWR Complex would help reduce the need for extensive purchases of equipment specifically for Wapanocca NWR. The refuge may need to drill and operate several wells, if feasible, practical, and environmentally justifiable.

Strategies:

- Replace the existing refuge office at the same location with a 2,500-square-foot headquarters/visitor contact station, using ARRA funding (approximately $650,000) and incorporating green-building design features, to provide adequate facilities to meet the expectations and needs of the visiting public, to conduct visitor services programs, to facilitate work with partners, and to enable refuge staff to administer programs and operations.
- Obtain funding and resources to drill, operate, and maintain several wells on the refuge, if feasible and desirable in order to provide necessary water supplies to Wapanocca Lake.

- Acquire and keep on-site all equipment required for management and maintenance of moist-soil units.
- Keep all infrastructure, machinery, and equipment in good working order by regular upkeep and maintenance.
- When feasible, share equipment with other refuges in the Complex.
- Annually update and maintain the Equipment Priority Index (EPI) report to identify heavy equipment needs.
- Expand the existing equipment storage pole shed to provide adequate storage for all light and heavy equipment.
- Construct a heavy equipment wash pad area adjacent to the existing equipment storage shed that meets environmental requirements.
- Replace heavy equipment within the guidelines and time frames established by the Regional Heavy Equipment Coordinator.
- Recruit an engineering equipment operator and laborer to assist with maintaining, repairing, and updating facilities, infrastructure, and equipment.

V. Plan Implementation

INTRODUCTION

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

To accomplish the purpose, vision, goals, and objectives contained in this plan for Bald Knob, Big Lake, Cache River, and Wapanocca NWRs, this section identifies projects, funding and personnel needs, volunteers, partnership opportunities, step-down management plans, a monitoring and adaptive management plan, and plan review and revision.

PROPOSED PROJECTS

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

FISH AND WILDLIFE POPULATION MANAGEMENT

Bald Knob NWR

2007732682 – Granary East Canal
Rehabilitate damaged and leaking Granary East Canal. This canal is critical to providing water to over 1,800 acres of cropland and moist-soils and is necessary to provide flooding for wintering waterfowl, which have exceeded 600,000 ducks and 125,000 geese, as well as other migratory birds on this refuge. This is a part of the main irrigation canal and is the life force behind all refuge programs. The canal has partially filled in due to erosion of the banks and deposition of suspended sediments from flows and leaks have resulted from underminings of beavers, nutria, and crayfish. Some of the existing steel pipes have rusted through due to the highly acidic soils and add to the leakage problems. An estimated 1 to 2 feet of material will be dredged from the canal bottom for approximately 2 miles, the slopes will be reshaped and reworked to remove holes caused by animals, trees, and other debris removed and deposited on site. All aspects of the refuge's public use programs will benefit from this work as there is a direct correlation between them and the watering efficiency. The work will also greatly help the refuge meet it goals and objectives for which it was established.
Estimated cost $85,000.
(Linkages: Bald Knob NWR Objectives 1-1, 1-3, 1-4, 1-5, 1-14, 2-1, 2-4, and 4-4)

2007716105 – 300-Acre Field Culvert Crossing
This field is a substantial part of the refuge cooperative farming program and is a critical component of the migratory bird management program conducted on the refuge. The refuge is the largest staging area for Northern Pintail in Arkansas and winters upwards of 600,000 ducks. This field has 7 separate crossings consisting of 12 different pipes and water control structures. All pipes and water control structures are severely rusted out, have severe erosion around them, and need to be replaced. The pipes need to be replaced with non-corrosive aluminum materials. Replacement pipes and water control structures include: two 24"X40' aluminum pipes, three 24"X40' aluminum pipes with aluminum screwgates, two 24" X40' aluminum pipes with aluminum stop-log risers, one 24"X80' aluminum pipe with an aluminum stop-log riser, and one 30"X40' aluminum pipe with an aluminum screwgate.
Estimated cost $60,000.
(Linkages: Bald Knob NWR Objectives 1-1, 1-3, 1-4, 2-1, 2-3, 2-4, 3-2, and 4-4)

2005204594 – Low Road
This road is vital to the refuge cooperative farming program and is a critical component of the migratory bird management program conducted on the refuge. The refuge is the largest staging area for Northern Pintail in Arkansas and winters upwards of 600,000 ducks. Approximately 0.75-mile of this road needs to be raised a minimum of 2 feet. The required material will be dug from the adjacent Bobtail Ditch. The project will replace existing rusted out pipes with aluminum pipes. Included are six 24" X 40' aluminum pipes with 4 stop-log risers and two aluminum screwgates. The last pipe will be a 30" X 40' aluminum pipe with an aluminum stop-log riser.
Estimated cost $60,000.
(Linkages: Bald Knob NWR Objectives 1.1, 1-3, 1-4, 2-1, 2-3, 2-4, 3-2, and 5-3)

Biological Technician, GS-7
Provide one full-time biological technician to assist in various migratory bird counts and surveys, deer counts, furbearer scent stations, and in controlling nuisance beaver populations on Bald Knob NWR. A biological technician is needed to assist in moist-soil management manipulations and yield surveys on an average of 500 acres. The potential exists to initiate a Wood Duck trapping and banding program and to enhance the shorebird management program on this refuge identified as an "Important Bird Area." This position will also assist in the operation and manipulation of over 130 water control structures throughout the year which provide high-quality habitat for thousands of wintering waterfowl and migrating shore and wading birds.
Estimated cost $77,321
(Linkages: Bald Knob NWR Objectives 1-1, 1-9, 1-11, 2-1, 2-5, 3-1, and 5-1)

Cache River NWR

Rehabilitate Dixie Unit South water control structure
This project will replace three pipes and flashboard type risers located on the south road of the Dixie Farm Unit. Each of these 18"x 40' pipes and fitted flashboard risers are mission critical to the purpose of the refuge providing high-quality habitat for thousands of wintering waterfowl on this 2,400-acre sanctuary area. These structures were installed in 1993 and have become worn as a result of acidic type soils and will soon need to be replaced. This project will result in the installation of three new all-aluminum pipes with bolt-on type flashboard risers.
Estimated cost $27,000
(Linkages: Cache River NWR Objectives 1-1, 2-1, 2-3, and 2-4)

Rehabilitate Dixie Unit North water control structure
This project will replace five pipes and flashboard type risers located on the north road of the Dixie Farm Unit. Each of these pipes and fitted flashboard risers are mission critical to the purpose of the refuge and provide high-quality habitat for thousands of wintering waterfowl on this 2,400-acre sanctuary area. These structures were installed in 1995 and have become worn as a result of acidic type soils and will soon need to be replaced. This project will provide three new 18”x 40’ pipes and two 24”x 40’ pipes fitted with bolt-on type flashboard risers. All pipes and risers will be constructed of all aluminum material to prevent future corrosion problems.
Estimated cost $40,000
(Linkages: Cache River NWR Objectives 1-1, 2-1, 2-3, and 2-4)

Howell Tract Impoundment Restoration
Restore complete water management capabilities on 600 acres of moist-soil impoundments, on the Howell tract of the Cache River NWR. Identified as the most important wintering area for Mallard ducks in North America, this restoration will provide high-quality habitat for wintering waterfowl, migrating shorebirds, and secretive marsh birds. The project will include monitoring habitat and wildlife within these improved habitats, and adapt management activities to maximize habitat potential and wildlife use as identified in the approved 2008 Refuge Biological Review. These impoundments winter thousands of waterfowl, shorebirds and secretive marsh birds. Activities include creation of water wells, habitat, and wildlife surveys. Possible partners include DU and NRCS.
Estimated cost $165,556
(Linkages: Cache River NWR Objectives 1-1, 1-3, 1-4, 1-19, 2-4, 2-5, and 5-2)

Plunkett Farm Waterfowl Sanctuary Enhancement
Enhance water management opportunities on the 800-acre Plunkett Farm Unit waterfowl sanctuary. This tract annually winters 100,000 plus waterfowl on this refuge identified as the most important wintering area for mallard ducks in North America. Current water management abilities allow only a portion of the flooded habitat to be available to waterfowl. This 800-acre waterfowl sanctuary is farmed by the refuge cooperative farmer, with crops left in the field to provide necessary food requirements for wintering birds. This project will enhance water management opportunities by constructing cross levees and installing pipes and water control structures to optimize water management capabilities. The project will benefit thousands of wintering waterfowl and provide management with the opportunity to provide later summer and early fall water for migrating shore and wading birds.
Estimated cost $50,800
(Linkages: Cache River NWR Objectives 1-1, 1-3, 1-4, 2-1, 2-3, and 2-4)

Biological Technician, GS-7
Provide biological assistance to initiate surveys on Cache River NWR to document status and distribution of wildlife species. This refuge has been identified as the most important area in the Mississippi Flyway for wintering Mallards and has been identified as one of only twenty-two “Wetlands of International Importance” within the United States. Refuge staff have been involved in the protection, management, and restoration of habitat to benefit both migratory birds and a variety of native wildlife species. Critical surveys on the refuge must be undertaken to assess the impact of habitat management actions identified within the approved refuge Habitat Management Plan. This project will include aerial census of waterfowl, Bald Eagle nesting activity, ground surveys of shore and wading birds, songbirds, and other wildlife. The project will provide improved trend data for trust

wildlife species within the lower Cache/White River basin. This position also will be available to assist other refuges in the Complex in implementing their biological programs.
Estimated cost $77,321
(Linkages: Bald Know NWR Objectives 1-17, 2-5, 3-1, 5-1; Big Lake NWR Objectives1-10, 2-3, 3-3, 5-1; Cache River NWR Objectives1-19, 2-5, 3-1, 5-1; and Wapanocca NWR Objectives 1-9, 2-4, 3-3, 5-1)

Engineering Equipment Operator, WG-8
Provide critical habitat for migratory birds at Cache River NWR. Providing flooded impoundments in late summer for migrating shorebirds and in early fall and winter for waterfowl is important on this refuge, which has been identified as the most important area in the Mississippi Flyway for wintering Mallards. These flooded areas provide critical wintering habitat for 500,000 plus wintering ducks and geese and are necessary to meet established objectives identified within the North American Waterfowl Plan and approved refuge Management Habitat Plan. Restoration and maintenance of levees, water control structures, and associated infrastructure are necessary to assure this critical habitat is available to arriving migratory birds. Much of this habitat has been virtually eliminated in eastern Arkansas due to hydrological alterations and farming practices.
Estimated cost $77,650
(Linkages: Cache River NWR Objectives 1-1, 1-3, 1-4, 1-5, 2-1, 2-3, 2-4, and 5-1)

Ecologist, GS-11
Conduct long-term habitat and wildlife monitoring on 65,000 acres of forested and wetland habitats on Cache River NWR and adapt management activities based on analysis and interpretation of results. These habitats are critical to trust species, such as forest breeding birds, woodcock, waterfowl, and endangered species, and resident species, such as bats, black bears, and Eastern Wild Turkeys, on a local and a landscape level. Planned activities would include, but not be limited to, creation of a quantified habitat data layer, species-specific habitat modeling, forest management, assessment of long-term forest health and effects of climate change, pre- and post-harvest wildlife and habitat surveys, and data analysis. This could be a joint effort with state universities, Lower Mississippi Valley Joint Venture Office, Arkansas Game and Fish Commission, Migratory Bird Office, The Nature Conservancy, Audubon, Arkansas Natural Heritage Commission, and possibly othr federal agencies. The ecologist also will serve the needs of the other refuges in the Complex in ecosystem and landscape planning, strategic habitat conservation, climate change initiatives, and coordination with conservation partners.
Estimated cost $114,439
(Linkages: Bald Knob NWR Objectives 1-17, 2-5, 3-1, 5-1; Big Lake NWR Objectives1-10, 2-3, 3-3, 5-1; Cache River NWR Objectives 1-19, 2-5, 3-1, 5-1, 5-2; and Wapanocca NWR Objectives 1-9, 2-4, 5-1, 5-2)

Wapanocca NWR

Grassland Restoration
This project will greatly improve the overall health of lands formerly incorporated into the refuge farm program; while at the same time have a positive impact on global warming and efforts with strategic habitat conservation. Planting of native warm-season grasses within 115 acres of higher elevation areas on Wapanocca NWR will restore the small prairie component currently missing on the refuge that historically occurred on high areas throughout the entire Mississippi Delta. Historically, these areas that bordered wetlands were very valuable as cover and nesting habitat for many species of migratory and resident birds. Native warm-season grasses have root systems up to 15 feet deep, which regenerate every 3 to 4 years, resulting in higher levels of organic matter, soil fertility, and

increased carbon sequestration, which is helpful in battling global warming. Once established, these grass stands are very low maintenance, drought tolerant, and will add much needed habitat diversity for wildlife on the refuge and surrounding lands.
Estimated Cost $105,062
(Linkages: Wapanocca NWR Objectives 1-5 and 1-6)

Bottomland Hardwood Forest Restoration
This project will restore 670 acres of bottomland hardwood forest on Wapanocca NWR. Wapanocca NWR is located in northeast Arkansas and surrounded by a sea of farmland, which prior to conversion to agriculture, consisted primarily of bottomland hardwood forest habitat. Currently, the only remaining tracts of bottomland hardwood forest in northeast Arkansas lay within Wapanocca NWR. Recent changes in weather due to global warming have made these wetland systems more difficult to manage as historical patterns have been altered. This project will restore flood and drainage control within in these bottomland hardwood units, which will then allow Wapanocca NWR staff to mimic the flooding that historically occurred naturally within these forests. Past issues that have converted these forests to willow swamps will be corrected by restoration of levees, drainage facilities, and replanting of hardwood trees native to Wapanocca NWR.
Estimated Cost $137,482
(Linkages: Wapanocca NWR Objectives 1-2, 1-7, and 2-2)

HABITAT MANAGEMENT

Bald Knob NWR

2007716161 – Little Red River Flood Protection Levee
Approximately 10 miles of the Little Red River Protection Levee run through the refuge from northwest to southeast. The levee is approximately 10 miles from the northwest section of the refuge down to the southeastern portion. The levee has blown out at least seven times during the last 50 years due to high water. The COE will not claim responsibility of the last mile due to the levee being overgrown with large diameter trees. The entire levee needs to be rehabilitated by removing trees and brush from the toe of the levee out to a distance of 25 feet. These tree roots allow water to seep through the levee, which potentially could cause a breach in the levee system. This levee system protects refuge buildings, various refuge neighbors, and the south part of Bald Knob, Arkansas, from being inundated during extreme floods. In addition to removing the trees and vegetation, the levee contains four 6’X150’ tanker culverts with flap gates. These pipes are located at the extreme northwest portion of the refuge. Various sized smaller steel pipes also need to be replaced throughout the remainder of the levee. They include two 24”X80’ pipes with flap gates, a 6’X150’ tanker culvert with a flap gate, a 54”X80’ pipe with flap gate. The smaller pipes need working screwgates. The last 6’X150’ tanker needs to be replaced with a hydraulic operated gate.

The last 3 miles of the levee is much lower than the upper end. Floodwaters previously have over-topped this section and caused further erosion. This is a critical part of the levee that needs to be built up and widened immediately.

Lastly, there is a Civilian Conservation Corps flood control structure located on Overflow Creek. This concrete structure contains four 7’ openings with steel flap gates. The flap gates are rusted out, rendering the entire floodgate structure useless. The steel floodgates need to be replaced and adapted so that refuge personnel can manipulate the amount of water that flows in or out.
Estimated costs $320,000
(Linkages: Bald Knob NWR Objectives 2-4, 3-2, and 3-3)

2007716106 – Middle 1,000-Acre Field Entrance Crossing
This field is a substantial part of the refuge cooperative farming program and is a critical component of the migratory bird management program conducted on the refuge. The refuge is the largest staging area for Northern Pintail in Arkansas and winters upwards of 600,000 ducks. This field has six separate crossings consisting of six different pipes and water control structures. All pipes and water control structures are severely rusted out, have severe erosion, and need to be replaced. The pipes need to be replaced with non-corrosive aluminum culverts. Replacement culverts and water control structures include: three 24"X40' aluminum pipes with aluminum screwgates and three 24"X40' aluminum pipes with aluminum stop-log risers.
Estimated cost $45,000
(Linkages: Bald Knob NWR Objectives 1-1, 2-1, 2-3 and 2-4)

Laborer, WG-4
Provide one full-time laborer to assist in day-to-day operations of Bald Knob NWR, including an expanding public use program. The laborer is needed to assist in vehicle, equipment, and facilities maintenance, including operating over 130 water control structures that provide high-quality habitat for wintering waterfowl and migrating shore and wading birds. The refuge has an ever-increasing nuisance beaver population that results in beavers continually plugging pipes and drainage ditches, undermining roads and levees, and flooding and destroying forest habitats, causing substantial damage, habitat degradation, and safety hazards to the visiting public. The laborer will also disk firelanes, manipulate moist-soil impoundments, and mow road shoulders and office grounds.
Estimated cost $56,610
(Linkages: Bald Knob Objectives 1-1, 1-3, 1-6, 2-2, 2-3, 2-4, 3-1, 5-1, and 5-3)

Engineering Equipment Operator, WG-8
Provide one full-time engineering equipment operator to maintain over 82 miles of existing public use refuge roads, 100 miles of irrigation and drainage ditches, 14 miles of irrigation canals, approximately 70 miles of levees, and over 130 water control structures. Bald Knob NWR winters over 600,000 waterfowl and has been identified as a primary staging area for Northern Pintail in Arkansas. The refuge is the premier site in Arkansas for observing shore and wading birds during their late summer/early fall migration. Much potential exists for improvements in water management capabilities for all migratory birds. An engineering equipment operator is needed to build over 5 miles of low profile levees to enhance and provide high quality migratory bird management.
Estimated cost $77,650
(Linkages: Bald Knob NWR Objectives 1-1, 1-3, 1-4, 1-6, 2-1, 2-2, 2-3, 2-4, 3-1, 5-1, and 5-3)

Construction of Headquarters/Visitor Contact Station and Expansion of Maintenance Shop
The current maintenance shop/equipment storage facility at Bald Knob NWR is inadequately sized and lacks the critical components to support maximum capacity and capability. The existing structure consists of a 40x40-foot shop building with an attached 60x40-foot 3-bay open pole shed. This facility does not provide enclosed workspace for heavy equipment repair and maintenance, contains no equipment lift, and is energy-inefficient. The exterior attached pole shed is not large enough to accommodate the refuge's heavy equipment fleet, thus causing millions of dollars of equipment to sit exposed to the elements. Due to these inadequacies, the shop building should be expanded by enclosing one of the existing pole shed bays; pouring a concrete floor; installing 2 overhead bay doors (to allow a drive-through bay); adding energy efficient lighting, insulation, and HVAC systems; and installing a hydraulic vehicle lift and adequate shelving and work table space. The pole shed expansion would include adding three, 20-foot open bays, installing a metal roof, gutter system, gravel floor, and expanding the shop yard and security fence enclosing the compound. This project would enable the refuge to conserve energy, to create a safer workplace, and to facilitate

implementation of habitat management projects on this 15,000-acre refuge that provides the best pintail duck and shorebird habitats in Arkansas.
Estimated cost: $100,000.
(Linkages: Bald Knob NWR Objectives 1-1, 1-3, 2-1, 2-3, 2-4, 4-2, and 5-3)

Big Lake NWR

Biological Technician, GS-7
Provide one full-time biological technician to meet required mandates and wildlife management goals and objectives at Big Lake NWR. The position will support congressionally mandated flood control activities through the operation and maintenance of electronic water control structures, dams, and levees. The refuge will gain a better understanding of flooded habitat conditions based on results of monitoring activities conducted in conjunction with the flood control. The technician will serve the refuge by conducting wildlife inventories, migratory bird banding operations, avian influenza monitoring, exotic and nuisance species control, performing routine maintenance on facilities and equipment, coordinating with AGFC on seasonal flooding of Big Lake WMA for waterfowl hunting, and coordinating with local university graduate students to conduct needed research on the refuge. Currently, these activities are not in practice and this project will allow the refuge to fulfill its legislated purposes.
Estimated cost $77,321
(Linkages: Big Lake NWR Objectives 1-1, 1-2, 1-3, 1-4, 1-10, 2-1, 2-2, 3-3, and 5-1)

Construction of Headquarters/Visitor Contact Station and Maintenance Shop
Funding has been obtained through the ARRA for replacement of the existing shop building with a suitable facility of approximately 3,000 square feet that would include two enclosed drive-through bays, concrete floors, adequate storage for materials and supplies, vehicle lift, environmentally sound vehicle wash pad, and outdoor equipment storage with an insulated roof. The new building would be located on approximately the same site as the existing building, thereby minimizing site disturbance, and not destroying any wildlife habitat. The building would use energy-conserving features, such as efficient HVAC, lighting, and water systems, and potential alternate energy sources. The current building would be removed, but existing shop yard, vehicle approaches, and parking areas would be utilized for the replacement facility.
Estimated cost: $590,000.
(Linkages: Bald Knob NWR Objectives 1-1, 1-2, 2-1, 3-1, 3-2, 4-2, and 5-3)

Cache River NWR

Repair damaged Plunkett Farm Unit Water Control Structure
Repair is required for the Plunkett Farm Unit water control structure; the concrete headwalls and outlet pipe have deteriorated and no longer function properly. The pipe is corroded and numerous cracks in the structure headwall, coupled with aged water control screw gates, cause unpredictable water management capabilities on this 800-acre waterfowl sanctuary. This refuge unit provides both sanctuary and desirable agricultural foods for 100,000 plus wintering waterfowl on this refuge declared a “Wetland of International Importance.” This water control structure and associated levee system are vital components for both maintaining desired water levels and preventing spring floods from damaging desirable agriculture foods produced through the refuge cooperative farming. The project will replace current structure with a new aluminum 48”x 80’ pipe fitted with aluminum screw gates on both ends. The side slopes of the structure will be stabilized using approximately 80 cubic yards of 90# type rip rap material. The project, when completed, will assist the refuge in meeting objectives identified in the North American Waterfowl Management Plan.
Estimated cost $25,000
(Linkages: Cache River NWR Objectives 1-1, 1-6, 2-1, 2-3, and 2-4)

Reconstruct the Bank of Brinkley Levee and Moist-Soil Unit Impoundments
Rehabilitate the dilapidated Bank of Brinkley tract levee system and moist-soil waterfowl impoundment. This impoundment and levee system were abandoned prior to Service ownership, and now contains numerous holes and washed out areas as a result of beaver burrowing and encroaching willow trees. Current condition of unit results in unpredictable and inadequate water management capabilities. This unit has the potential to provide high quality desirable wetland habitat that would benefit large populations of wintering waterfowl and migrating shore and wading birds. This project will restore the levee system by removing intrusive willow trees, re-shaping and grading levee top surfaces and side slopes, stabilizing levee side slopes with rip rap, and installing two aluminum pipes fitted with screw gates. The completed project will restore proper operation within this unit and provide enhanced water management capabilities for resident and migrating wildlife that depend on this type of wetland habitat. Refuge visitors will benefit by being provided additional wildlife observation, photography, hunting, and fishing opportunities.
Estimated cost $80,000
(Linkages: Cache River NWR Objectives 1-1,1-3, 1-4, 2-1, 2-3, 2-4, 4-3, 4-4, and 4-5)

Cache River NWR Stream Restoration
Restore the natural hydrology on streams and drainages on Cache River NWR. A total of 5.4 miles of channelized and altered streams will be restored and levees will be removed to allow for natural hydrology and restoration of habitat on this refuge declared a “Wetland of International Importance.” This project would be completed over a 5-year period and would restore approximately 1,980 acres of tributary watersheds and provide excellent habitat for refuge trust species, wintering waterfowl, migrating wading and marsh birds, and priority wildlife, such as American Woodcock and Wood Ducks. Restoration of these sites is an essential step to improving water quality and watershed integrity of the Cache River and Bayou DeView. The Nature Conservancy has expressed interest in partnering with the refuge on this project.
Estimated cost $170,640
(Linkages: Cache River NWR Objectives 1-4, 1-2, 1-3, 1-4, 1-5, 1-16, and 2-4)

Forestry Technician, GS-7
This project would enable the refuge to restore and monitor its bottomland hardwood forests. Management goals of this refuge designated as “A Wetland of International Importance” include reversing negative impacts of previous landowners by restoring drained wetlands and restoring bottomland hardwood forest vegetation. Accomplishment of this project will provide forested corridors for wildlife between remaining forested tracts, provide riparian buffers, improve sediment retention, and increase habitat for migratory birds and a variety of native wildlife species. This project will provide a forestry technician to assist in reforestation efforts, monitoring and surveying, and implementation of forest treatments identified within the approved refuge Habitat Management Plan. Wildlife that will benefit includes over 200 species of migratory songbirds, 50 species of mammals, and 45 species of reptiles and amphibians that occur on this refuge. The forestry technician also will serve other refuges in the Complex to improve their forestry habitat management programs.
Estimated cost $77,321
(Linkages: Bald Knob NWR Objectives 2-2, 2-5, 3-1, 5-1; Big Lake NWR 2-2, 2-3, 3-3, 5-1; Cache River NWR 2-2, 2-5, 3-1, 5-1; and Wapanocca NWR 2-2, 2-4, 3-1, 5-1)

Assistant Forester, GS-11
This project will enable the refuge to restore and conduct long-term monitoring of native bottomland hardwood forest habitats on this “Wetland of International Importance.” Emphasis will be on the restoration of ecosystem functions and will target specific forest structure, species composition, and age structure goals. The assistant forester position will provide assistance to the forester, with priority placed on emulating natural disturbance patterns, both spatially and temporally. Approximately 80

percent of the existing bottomland forest on the refuge was heavily cut prior to refuge acquisition. Species composition, age structure, and vertical structure require treatment to restore natural forest structure. Over 200 species of migratory songbirds, 50 species of mammals, and 45 species of reptiles and amphibians will benefit from the proper implementation of the refuge's Habitat Management Plan. This position also will serve other refuges in the Complex in planning and implementing their respective forest habitat management programs.
Estimated cost $114,439
(Linkages: Bald Knob NWR Objectives 2-2, 2-5, 3-1, 5-1; Big Lake NWR 2-2, 2-3, 3-3, 5-1; Cache River NWR 2-2, 2-5, 3-1, 5-1; and Wapanocca NWR 2-2, 2-4, 3-1, 5-1)

Laborer, WG-4
Provide a laborer to assist in day-to-day operations of this refuge, which includes an expanding public use program. The laborer is needed to assist in vehicle, equipment, and facilities maintenance, including operating more than 130 water control structures that provide high-quality habitat for wintering waterfowl and migrating shore and wading birds. The refuge has an ever-increasing nuisance beaver population in which beavers are continually plugging pipes, damming drainage ditches, undermining roads and levees, and flooding and destroying forest habitats, causing substantial damage, habitat degradation, and safety hazards for the visiting public. The laborer will also disk firelanes, manipulate moist-soil impoundments, mow road shoulders, and maintain office grounds.
Estimated cost $56,610
(Linkages: Cache River NWR Objectives 1-1, 1-6, 2-1, 2-2, 2-3, 2-4, 3-1, 5-1, and 5-3)

Wapanocca NWR

2007733000 – Big Creek Bridge
Replace worn and inadequate Big Creek Bridge, which provides the only crossing area over Big Creek for refuge visitors and staff. The bridge is inadequate for transporting the heavy equipment used by refuge management and cooperative farmer. The entrance ramp to the bridge is eroded and large pot holes have resulted at the base of the bridge. The project will provide for engineering design, planning, and construction for a new replacement bridge that meets Federal Highway Administration safety requirements.
Estimated cost $200,000
(Linkages: Wapanocca NWR Objectives 1-1, 2-1, 2-2, 2-3, 3-1, and 4-2)

2007733030 – County Ditch 4 (drainage)
Rehabilitate silted County Ditch 4 drainage ditch, which is the main drainage ditch providing drainage capabilities for refuge water management units and adjacent private land farmers and refuge neighbors. The ditch bottom and side slopes contain large amounts of silt and intrusive woody vegetation, resulting in poor and inadequate drainage and contributing to nuisance beaver problems. The project will provide for removal of undesirable woody vegetation along ditch bank slopes and removal of silt buildup in bottom of ditch. This project will benefit the refuge, adjacent private land farmers, and refuge neighbors through improved capability for all parties utilizing this extensive drainage system.
Estimated cost $150,000
(Linkages: Wapanocca NWR Objectives 2-1, 3-1, and 3-3)

Biological Technician, GS-7
To offset rapidly advancing environmental challenges, such as global warming, that may be linked to the increasingly frequent and prolonged periods of drought in eastern Arkansas, a much greater emphasis on biological monitoring and maintenance within Wapanocca NWR is required. Responsibilities within this project include monitoring of resources directly impacting the quality of

refuge habitats, including, but not limited to, refuge water levels in correlation with the nearby Mississippi River and groundwater levels, presence and eradication of exotic plant species promoted by drought tolerance and longer growing seasons associated with global warming, and changes in refuge soil composition, with emphasis on mineral level fluctuations within wetland units flooded by groundwater compared to those receiving natural flooding. Additional responsibilities include wildlife population monitoring, waterfowl banding, and assisting with refuge management plans.
Estimated cost $77,321
(Linkages: Wapanocca NWR Objectives 1-1, 1-9, 2-1, 2-2, 2-3, 2-4, 3-1, 3-3, and 5.1)

RESOURCE PROTECTION

Big Lake NWR

2007716155 – Ditch 81 Levee
Clear vegetation overgrowth on the Ditch 81 Levee located adjacent to Ditch 81 on the refuge's east boundary. The levee is approximately 9.6 miles long, starting at the refuge Headquarters and ending at the North End Water Control Structure. The entire western edge of the levee is overgrown with trees and vegetation. Project improvements include removing all trees and clearing vegetation in accordance with COE policy pertaining to maintenance of levees.
Estimated cost $200,000
(Linkage: Big Lake NWR Objective 3-1)

Restore Ecosystem Health and Natural Hydrology
This project would enable restoration and improvement of ecosystem health and natural hydrology through increased water management capability at Big Lake NWR. Numerous channels and sloughs within the Big Lake basin have become blocked with trash and debris from frequent federally mandated flood control and relief events on the refuge. This prevents natural flow of water to several areas on the refuge, increases flooding in the Wilderness Area, restricts visitor access, and significantly reduces the quality of wetland habitats on the refuge. A biological technician would aid in sampling and monitoring of flood waters. An amphibious excavator capable of reaching these inaccessible areas is needed to remove the debris to restore flows through these naturally meandering channels and sloughs. This will benefit the hundreds of thousands of wintering waterfowl and migrating shorebirds that use the refuge. Additionally, habitat quality will improve for other wildlife, such as Bald Eagle and federally endangered fat pocketbook mussel.
Estimated cost $240,000
(Linkages: Big Lake NWR Objectives 1-1, 1-3, 1-8, 3-1, and 3-2)

Reduce Invading American Lotus to less than 30 percent of Open Water Areas
In order to keep water bodies open and free of invading American lotus and black willow an aquatic herbicide must be applied annually in these areas. Controlling nuisance plants will promote the growth of waterfowl foods, reduce sediment accumulation, increase use of these areas by nesting Bald Eagles, and enhance public use in these areas. Funds will be used to purchase chemical, sprayer, contracting aerial applications, and fabricating and aquatic vegetation cutter attachment for use on an existing john boat.
Estimated cost $65,000
(Linkage: Big Lake NWR Objective 3-3)

Enhance Seasonal Water Level Management
Enhance seasonal water level management with the installation of a large stop log water control structure in the southend Highway 18 spillway dam. The structure currently does not allow for full water level management capability for the entire Big Lake NWR wetland area. With the installation of

a 6-foot-high bay of stop logs within the existing dam, total water level management could be accomplished. The structure would allow for water level manipulation by staff to promote beneficial plant growth, control of invasive plant species growth, and seasonal flooding or dewatering areas of the lake during the summer and winter months.
Estimated cost $250,000
(Linkages: Big Lake NWR Objectives 2-1, 2-3, 3-1, and 3-3)

Hydrologist GS-11
Provide one fulltime hydrologist to meet required mandates and wildlife management goals and objectives at Big Lake NWR and the other refuges within the Complex. The position will provide the Complex with the knowledge needed to better meet the demands and impacts of congressionally mandated flood control activities at Big Lake NWR, restore natural hydrology at Wapanocca NWR, coordinate river and stream restoration projects at Cache River NWR, and provide technical guidance in water management issues at Bald Knob NWR. The Complex will gain a better understanding of aquatic habitat conditions, implement monitoring activities, and plan corrective actions to reduce negative impacts of siltation, pollution, irrigation withdraws, inadequate water sources, degraded aquatic habitats, and severely altered hydrological systems. The hydrologist will work with partners to examine system health and determine the best course of action needed to meet refuge objectives and protect the trust resources. Currently, these activities are not adequately implemented and this project will allow the Complex to better meet its purposes, vision, goals, and objectives.
Estimated cost $114,439
(Linkages: Bald Knob NWR Objectives 1-15, 2-5, 3-2, 5-1; Big Lake NWR Objectives 2-3, 3-1, 5-1; Cache River NWR Objectives 1-16, 2-5, 3-2, 5-1; and Wapanocca NWR Objectives 2-4, 3-1, 5-1)

Cache River NWR

Realty Specialist, GS-12
This project would enable much greater work efficiencies and customer service throughout the Complex. This 66,500-acre refuge lies in the heart of the most pristine bottomland hardwood remaining within the Lower Mississippi Alluvial Valley. The Cache River NWR has been identified as the most important wintering area for Mallard ducks in North America and is 1 of only 22 land areas within the United States listed as a “Wetland of International Importance.” With an approved land acquisition boundary of approximately 186,000 acres, a realty specialist position is needed to direct negotiations and conduct appraisals with the many identified willing sellers. Management goals of this refuge include reversing negative impacts of previous landowners that drained wetlands and restoring native bottomland hardwood forests. Accomplishment of this project will provide forested corridors for wildlife between remaining forested tracts, provide riparian buffers, improve sediment retention and increase habitat for migratory birds and a variety of native wildlife species. Additionally, this position would be available to coordinate realty issues such as acquisition, surveys, boundary integrity, and adjacent landowner relations on the Complex and on the other refuges in Arkansas.
Estimated cost $137,165
(Linkages: Cache River NWR Objectives 3-4; and 5-1 for all refuges)

Wapanocca NWR

2006558819 – Dredge Ditch 8
Provide equipment, labor, and materials, to dredge approximately one foot of material from Drainage Ditch 8 (material to be deposited on site) and complete selective clearing and brush mowing. A medium-density, tractor with rotary mower would be needed to clear the length of the ditch and out to 20 feet.
Estimated cost $875,000
(Linkage: Wapanocca NWR Objective 3-1)

2006557060 – Ditch 2
This project is needed to remove silt buildup and trees encroaching on slopes of Ditch 2. Ditch 2 flows into Ditch 5 and eventually into Ditch 8 on the north side of Wapanocca NWR. It is one of the primary water delivery channels to Wapanocca Lake. The amount of water flow into the lake during flood events is vital to maintain sufficient water level in Wapanocca Lake; this project will enable more reliable water supply and delivery.
Estimated cost $300,000
(Linkage: Wapanocca NWR Objective 3-11)

2007716250 – Levee 5 Water control Structure
The levee 5 water control structure is located on the east end of Woody Pond. Due to water no longer being allowed to enter Wapanocca Lake on the north structure, all water must flow through the levee 5 structure. This structure was improperly installed at too low a depth and is easily silted in and clogged during flood events. In order to maintain sufficient water levels in Wapanocca Lake, this structure must be rehabilitated.
Estimated cost $125,000
(Linkage: Wapanocca NWR Objective 3-1)

Engineering Equipment Operator, WG-8
This project will provide enhanced habitat diversity and quality on Wapanocca NWR. Responsibilities will include equipment operation to accomplish restoration of wetland units, eradication of exotic plant species, maintenance of facilities for improvements in visitor services, and development of new habitat management areas. Additional benefits include a sizeable increase in overall acreage managed within the refuge, increased safety for all refuge visitors and staff, and an overall increase in opportunities for the visiting public to enjoy the refuge and connect with nature.
Estimated cost $77,650
(Linkages: Wapanocca NWR Objective 1-1, 1-3, 2-1, 3-1, 3-3, 4-2, 5-1, and 5-3)

Laborer WG-4
Hiring a laborer will greatly increase refuge management capabilities, primarily water control capabilities, on Wapanocca NWR. Responsibilities of this position will include removal of obstructions from beavers within the ditch and drainage system on refuge lands that supply water to 2,050 acres in Wapanocca Lake and surrounding swamplands. In addition, 300 acres of wetlands actively managed for migrating waterfowl will benefit from the increase in these capabilities. Currently, beaver, muskrat, and nutria interfere with the ditch system and levees, greatly reducing the required ability to control flooding and drainage capabilities of the refuge. This project will reverse the damages to refuge lands caused by these species and increase the overall quality of habitats.
Estimated cost $56,610
(Linkages: Wapanocca NWR Objectives 1-1, 3-1, and 3-3)

VISITOR SERVICES

Bald Knob NWR

Park Ranger, Visitor Services Specialist, GS-9
A park ranger (Visitor Services specialist) would be hired to develop and implement a full range of visitor services programs on the refuge, including environmental outreach and interpretive programs. The project would expand on existing contacts and connections with local birders, hunters, and fishermen from Newport, Searcy, and Little Rock, Arkansas, and contribute to the establishment of a successful volunteer programs and Friends Group. The Visitor Services specialist would represent the refuge at various local and state-wide gatherings, fairs, and other special events. The Visitor

Services specialist would partner with the Friends Group and volunteers to include outreach and education as part of an overall refuge public use program to connect a potential 800,000 residents and neighbors with nature. Development of an on-site interpretive program would involve updating and/or creating various printed materials, such as brochures and bird, reptile, and amphibian lists. This position would be involved with the planning of public use facilities, kiosks, information stations, nature trails, and observational towers and blinds.
Estimated cost $94,588
(Linkages: Bald Knob NWR Objectives 4-1, 4-2, 4-6, 4-7, and 5-1)

2007732649 – Office Trailer
Funding has been obtained through the American Reinvestment and Recovery Act (ARRA) for replacement of the existing office trailer with a suitable facility to allow for efficient public use management and administration of a visitor services program, including opportunities for environmental education and interpretation. The proposed headquarters/visitor contact station would be 1-story, approximately 2,500 square feet in size, would be fully ADA-compliant, and would include an exhibit area, volunteer/receptionist area, conference room, breakroom, law enforcement storage, public restrooms, staff offices, safe room, and public parking. This facility would be constructed within close proximity of the current office site and would incorporate energy and resource conserving features, reducing carbon and climate impacts, and would not result in the loss of wildlife habitat.
Estimated cost: $650,000.
(Linkages: Bald Knob NWR Objectives 4-2, 4-6, 4-7, 5-1, and 5-3)

04134134 – Bottom 300-Acre Field Road
Rehabilitate the 1.41 mile X 26-foot Bottom 300-Acre Field Road, which is used extensively by the public to access the southern parts of the refuge. The road is prone to flooding and is inundated at least three times each year for several weeks. The road needs to be rehabilitated by disking and reshaping the entire length of the road, and raising a portion (2,000 feet) of the road approximately 2 feet. In addition, geo-textile fabric and 6 to 12 inches of Class 7 gravel will be placed on the raised portion for additional strength. The road receives use from approximately 60,000 visitors each year.
Estimated cost $100,000
(Linkages: Bald Knob NWR Objectives 4-3, 4-4, 4-5, and 4-7)

2005218680 – Mingo Creek Access Road
The Mingo Creek Access Road is the only access road to the approximately 2,000-acre Mingo Creek Unit. This road system contains a system of smaller roads, accessible only by ATV from the main parking area, that is heavily utilized by hunters and visitors to the Mingo Creek Unit of Bald Knob NWR. These roads allow users to safely access various parts of the Mingo Creek Unit and be dispersed so that hunter conflicts are kept to a minimum and disputes between various user groups are also minimized. The Federal Highway Administration listed this road system as poor in its report dated 3/1/2001. Improvements needed include the addition of 6 to 8 inches of Class 7 gravel over the approximately 8 miles in length. Additionally, a crossing on Mingo Creek consisting of two 48” X 20’ plastic pipes needs to be replaced with a 6’ X 40’ tanker culvert. The crossing needs to be reinforced with approximately 100 tons of R-400 rip-rap. This road is used by approximately 20,000 visitors each year.
Estimated cost $200,000
(Linkages: Bald Knob Objectives 4-3, 4-4, 4-5, and 4-7)

2007716141 – Main Entrance Gate
The five main entrance gates necessary to prevent public entry and disturbance into the waterfowl sanctuary area and to seal off the refuge during floods or other emergencies are damaged and need to be replaced. Although these gates are constructed from steel materials, they have been damaged

from accidents, vandalism, and farm implements. The 32-foot gates need to be replaced with extremely heavy duty materials and protected with paint.
Estimated cost $20,000
(Linkages: Bald Knob NWR Objectives 1-1, 4-2, 4-3, 4-4, 4-5, and 4-7)

Big Lake NWR

2007733603 – Big Lake NWR Office
Funding has been obtained through the ARRA for replacement of the existing office with a headquarters/visitor contact station. The proposed facility would be 1-story, approximately 2,500 square feet in size, and would include four staff offices, conference room, breakroom, unisex staff restroom, law enforcement storage, utility/storage closets, fax/photocopy/file room, mudroom, separate male/female public restrooms, an exhibit area, and volunteer/receptionist area. This facility would be fully ADA-compliant, would provide adequate administrative function, and would enable suitable opportunities for visitor reception and interpretation. The building design would incorporate greening features, including energy-conserving lighting, HVAC and insulation qualities, water-conserving systems, and options for alternate energy. It also would provide a safe and comfortable environment for staff and visitors. The current office would be removed and the new headquarters/visitor contact station would be sited within close proximity to the current building within the existing office/maintenance shop grounds, which are already disturbed; therefore, new construction would necessitate minimal site disturbance and no wildlife habitat would be destroyed. Funding amount would include planning/design, engineering, construction, furniture, and interpretive exhibits.
Estimated cost $650,000.
(Linkages: Big Lake NWR Objectives 4-2, 4-6, 4-7, 5-1, and 5-3)

2007716164 – Timm's Point Observation Area
Repair retaining cracked wall and sidewalk at the Timm's Point Observation Area that provides wildlife viewing opportunities for 50,000 visitors annually.
Estimated cost $100,000
(Linkages: Big Lake NWR Objectives 4-2, 4-5, and 4-7)

2007733607 – Ditch 28 Bridge
Repair the unsafe open grating steel bridge located on Ditch 28 at Big Lake NWR. The bridge provides access for refuge heavy equipment and pedestrian visitors into the 114-acre mud slough moist-soil unit and 30-acre Baker Island field. The bridge is not adequately posted with load limit signs, there are no guard rails, pins can be unfastened between spans, and there is buildup of logs and debris under bridge pilings. The project will include the installation of load posting signs and object markers at the north end, a curb type bridge rail attached to sides, permanently set pins with the washer secured in place at stringer slices, and clearing of logs and debris at the south bent and under south span. As a result of this project, the public and refuge with be afforded continued safe travel across the bridge and also the bridge usable life will be prolonged before total replacement.
Estimated cost $300,000
(Linkages: Big Lake NWR Objectives 2-1 and 4-2)

2005207265 – Timm's Point Parking Area
Timm's Point Parking Area is located on Bald Cypress Wildlife Drive 3 miles from the intersection of Highway 18 and Bald Cypress Wildlife Drive. Currently, the facility has an area of 29,348 square feet. The gravel surface is deteriorating and contains large patches of grass; the style of parking is not delineated for the 25-car area. The parking facility is currently open to the public for year-round use. Project improvements include clearing and grubbing the parking area, performing minor grading and overlaying the parking area with 4 inches of crushed aggregate, installing 25 wheel stops to delineate

parking stalls, and installing one stop sign at the egress point to Bald Cypress Wildlife Drive. This facility serves over 50,000 visitors annually.
Estimated cost $75,000
(Linkage: Big Lake NWR Objective 4-2)

2006531982 – Big Lake Bank Fishing Parking Area
Big Lake Bank Fishing Parking Lot is located on Highway 18, 0.5-mile from the intersection of the refuge entrance road and Highway 18. Currently, the facility has an area of 5,987 square feet and consists of a gravel/dirt mix surface with some protruding patches of grass. The entrance measures 20' X 50' with an asphalt surface. Parking is not delineated within the lot that contains space for parking. The parking facility is currently open to the public for year-round use. Project improvements include clearing and grubbing the parking area, minor grading, and overlaying the parking area with 4 inches of crushed aggregate and the entrance with 2 inches of asphalt. Nine wheel stops will be installed to delineate parking stalls and one stall will be signed and designed as fully accessible. A stop sign will be installed at the egress point.
Estimated cost $50,000
(Linkage: Big Lake NWR Objective 4-4)

2006557432 – Ditch 81 Levee Road Parking Area
Currently, the facility has dimensions of 60' X 32' and is overgrown with thick grassy vegetation. Parking spaces are not delineated; there is room to park 6 vehicles. The parking facility is currently open to the public October through December. Project improvements include clearing and grubbing the parking area, performing minor grading, and overlaying the parking area with 4 inches of crushed aggregate. Six wheel stops will be installed to delineate parking stalls and one stall will be designated as fully accessible parking and delineated with a sign.
Estimated cost $15,000
(Linkages: Big Lake NWR Objectives 4-2 and 4-3)

2007716115 – Brights Landing Fishing Pier
The Brights Landing Fishing Pier is located adjacent to the Brights Landing Parking Area and is in disrepair, creating a safety hazard. Project improvements include reinforcing the structure to prevent swaying and instability, re-staining the entire structure, and replacing the damaged roof. The structure is currently open to year-round use and serves more than 50,000 visitors annually.
Estimated cost $20,000
(Linkages: Big Lake NWR Objectives 4-2 and 4-4)

2005222810 – Wildlife Auto Drive
The Bald Cypress Wildlife Drive begins at the intersection of Refuge Entrance Road and ends at the gate at Timm's Point Parking Area. The roadway is approximately 3.19 miles in length and 18 feet in width. The roadway surface is gravel and needs repair and maintenance. Project improvements include overlaying the surface with 6 inches of gravel, reshaping, and grading on a regular basis. The roadway is currently open to the public for year-round use and serves about 50,000 visitors annually.
Estimated cost $900,000
(Linkages: Big Lake NWR Objectives 4-4 and 4-5)

2006531558 – Brights Landing Parking Area
Brights Landing Parking Area is located on Highway 18, 0.3-mile from the intersection of Highway 18 and Refuge Entrance Road. Currently, the facility has an area of 42,581 square feet and the gravel surface is overgrown with patches of grass in the boat ramp parking area. There are two fully accessible parking spaces, but the remainder of the parking area is not delineated (there is sufficient space to park 40

vehicles). The boat ramp has a concrete surface. There is a walking trail adjacent to the boat ramp parking and an observation pier next to the fully accessible parking area. The parking facility is currently open to the public for year-round use and serves about 50,000 visitors annually. Project improvements include clearing and grubbing the parking area, performing minor grading, and overlaying the parking area with 4 inches of crushed aggregate, installing 40 wheel stops to delineate parking, and designating two stalls as universally accessible with appropriate signage.
Estimated cost $75,000
(Linkages: Big Lake NWR Objectives 4-2, 4-4, 4-5, and 4-7)

2006531978 – Headquarters Visitors Parking Area
The Headquarters Visitor Parking Area is located on Refuge Entrance Road, 0.1-mile from the intersection of Highway 18. The facility has an area of 8,979 square feet and has a gravel surface that is in need of repair. The style of parking is not delineated; there is space to park approximately 14 to 28 vehicles. The facility is currently open to the public for year-round use and serves more than 50,000 visitors annually. Project improvements include overlaying the parking area with 4 inches of crushed rock aggregate and installing 20 wheel stops to delineate parking spaces.
Estimated cost $100,000
(Linkage: Big Lake NWR Objective 4-2)

2006531989 – Oak Island Parking Area
The Oak Island Parking Area is located on Bald Cypress Wildlife Drive, 1.2 miles from the intersection of Highway 18 and Bald Cypress Wildlife Drive. The facility has an area of 2,239 square feet of graveled surfaced and space to park five vehicles, but parking spaces are not delineated. The parking facility is currently open to the public for year-round use and serves about 10,000 visitors annually. The gravel surface of the parking area is degraded and overgrown with grass. Project improvements include clearing and grubbing the parking area, clearing overgrowth from entrance roadway shoulders and centerline, and regrading and shaping the entrance road. Also perform minor grading and overlay the parking area with 4 inches of crushed aggregate, install five wheel stops to delineate parking spaces, and designate one space with a sign as fully accessible.
Estimated cost $25,000
(Linkages: Big Lake NWR Objectives 4-2, 4-4, and 4-5)

2006531992 – Handicapped Parking Area
This parking area, specifically used for fully accessible parking, is located on Refuge Entrance Road, 0.1-mile from the intersection of Highway 18 and Refuge Entrance Road. The facility has an area of 310 square feet and has a concrete surface that is need of resurfacing to prevent wheelchair accidents and to enhance accessibility. The facility is currently open to the public for year-round use.
Estimated cost $25,000
(Linkage: Big Lake NWR Objective 4-2)

Improve Educational and Interpretive Materials to Connect People to Nature
Enhance visitor services at Big Lake NWR. About 35,000 people annually enjoy four interpretive trails, two wildlife observation sites, two permanent spotting scopes, a photo blind, and an entrance kiosk with interpretive panels. However, these facilities are in need of repair and improvements. Approximately 20 new panels are needed to adequately inform the visiting public about refuge regulations, recreational opportunities, and provide educational information regarding wildlife and habitat management. Several amenities, such as benches, an environmental education pavilion, and improved access, will enhance non-consumptive, wildlife-dependent recreation for more than 50,000 visitors per year.
Estimated cost $150,000
(Linkages: Big Lake NWR Objectives 3-2, 3-5, 4-5, 4-6, 4-7, and 5-2)

Park Ranger (LE), GS-9
Provide one fulltime law enforcement officer to protect wildlife and habitat resources, especially designated lands (Wilderness Area and National Natural Landmark), facilities, employees, and the public on the 11,038-acre Big Lake and 5,061-acre Wapanocca NWRs, fee title tracts, and conservation easements located in northeast Arkansas. Director's Order #155 requires the Service to reduce dependency on dual-function refuge officers and progress towards full-time enforcement. This officer will meet that mandate because the Complex has lost three dual function officers and Big Lake NWR has been without full-time law enforcement since it was established in 1915. Big Lake and Wapanocca NWRs have more than 7,000 acres of open water habitat for boaters and anglers, numerous bank fishing sites, active hunting programs, designated wilderness area (Big Lake NWR), wildlife auto drives, and receive heavy visitation from diverse user groups. The refuges have experienced numerous law enforcement incidents in recent times due to minimal law enforcement presence. This project will dedicate a fulltime law enforcement officer to protect refuge resources and visitors and provide outreach services on Big Lake and Wapanocca NWRs.
Estimated cost $97,292
(Linkages: Big Lake NWR Objectives 3.3, 3-5, 4-2, 4-3, 4-4, 4-5, 5-1; Wapanocca NWR Objectives 3-5, 4-2, 4-3, 4-4, 4-5, 5-1)

Cache River NWR

03125419 – Gin Lane South Road
This 1.6-mile dirt public access road is in poor condition. The dirt road surface becomes muddy, slippery, and rutted during wet periods, causing unpredictable and hazardous driving conditions for refuge visitors. Vehicles often become stuck and slide into adjacent ditches. This project will rehabilitate approximately 1.6 miles of public access road used annually by more than 120,000 refuge visitors. Project includes grading and shaping road surfaces, installing culverts to promote surface drainage, adding dirt fill in rutted and washed areas, and spot graveling with SB-2 type gravel on rutted sections. Project will provide safe, unrestricted, all-weather access for refuge visitors and management. This road is the only available public access point to this popular refuge tract.
Estimated cost $160,000
(Linkages: Cache River NWR Objectives 4-2 and 4-3)

Replace Worn Refuge Boundary Signs
Cache River NWR is composed of over 78 non-contiguous land tracts, with more than 500 miles of refuge boundary within the 10-year floodplain of the Cache River. Maintaining and posting boundaries is a continuous job. This project would provide boundary signs, sign post, and hardware to meet the backlog of boundary posting needs. Posting is required to protect the refuge from major wildlife violations, including timber theft, encroachment by adjoining landowners, drainage, and general resource violations. Efforts to prosecute violations without properly marked boundaries are often denied by the U.S. Attorney.
Estimated cost $25,000
(Linkages: Cache River NWR Objectives 3-4, 4-2, 4-3, 4-4, and 4-5)

2005253254 – Cache Bayou Road
This 2.3-mile primitive surface public access road provides refuge visitors with access into the north side of the Dixie Farm unit. During wet conditions, the road surface becomes slippery and develops deep rutted sections, causing unpredictable and unsafe driving conditions for refuge visitors. This project will include grading and shaping of the road surface, filling rutted sections, and surfacing the

road with approximately 6 inches of SB-2 type gravel. When completed, this project will provide all-weather access to more than 40,000 refuge visitors pursuing recreational opportunities on this popular refuge tract.
Estimated cost $180,000
(Linkages: Cache River NWR Objectives 4-2, 4-3, and 4-5)

2005204642 – Horseshoe Lake Road
This project will rehabilitate the Horseshoe Lake 1.6-mile public access road. This dirt surface road is worn and in its current condition prevents refuge visitors and adjacent landowners from accessing both the refuge and neighboring private property. Road surface is extremely rutted and holds water in deep holes throughout most of the year, keeping the road surface in a muddy condition. Vehicles often become stuck on this road and the slippery surface creates unsafe and unpredictable driving conditions for refuge visitors. This project will provide for rehabilitation of the entire road through grading and shaping of the roadway surface, filling deep holes and ruts, and surfacing the prepared roadway with approximately 6 inches of SB-2 type gravel. This road is the only public access to this refuge tract and Horseshoe Lake.
Estimated cost $120,000
(Linkages: Cache River NWR Objectives 4-2, 4-3, and 4-4)

2005202117 – Robinson Tract East Road
This project will rehabilitate the 0.96-mile Robinson East Road public access road. The dirt surface of this public access road has become rutted and prevents adequate drainage from the road surface. Visitors pursuing hunting, wildlife observation, and photography and accessing the refuge on this road often encounter unsafe driving conditions and become stuck or slide into adjacent deep ditches. This is the only road providing access into this popular refuge tract. This project will rehabilitate the road by grading and shaping, filling holes and ruts with B-stone type material and topping the road surface with approximately 6 inches of SB-2 type material. Completed project will provide safe all-weather access to refuge visitors.
Estimated cost $50,000
(Linkages: Cache River NWR Objectives 4-2, 4-3, and 4-5)

2005202761 – Robinson Tract West Road
Rehabilitate the 1-mile Robinson Tract West public access road. This dirt surface road is currently accessible by 4-wheel drive vehicles only and provides the only public access available to this popular refuge tract. The road surface becomes muddy during wet conditions and prevents the majority of refuge visitors from accessing the refuge. Project plans include grading and shaping of the roadway surface, cutting ditches along road shoulders to provide drainage, installing drainage pipes at low-lying areas, filling holes and ruts with B-stone type rock and surfacing road with approximately 6 inches of SB-2 type gravel material. When completed this project will provide refuge visitors with safe, all-weather access to this refuge tract.
Estimated cost $50,000
(Linkages: Cache River NWR Objectives 4-2, 4-3, and 4-5)

Rehabilitate unsafe Horseshoe Lake boat ramp and parking area
Project will improve essential boat access to central/southern portion of the refuge. Deficiencies include settled 15’x 50’x 6” concrete ramp, and degraded 1,942-square-foot parking area. Improvements will include grading and graveling the parking area, slope improvements, and a new concrete ramp. Anglers, hunters, and birdwatchers seeking boat access into Horseshoe Lake will have a safe facility for future use.
Estimated cost $15,000
(Linkages: Cache River NWR Objectives 4-2, 4-3, 4-4 and 4-5)

Park Ranger, Visitor Services Manager, GS-11
Develop and implement the visitor services program at Cache River NWR. Designated as a "Wetland of International Importance," this refuge is located between the two major cities of Little Rock, Arkansas, and Memphis, Tennessee, with the potential to provide outreach and connect a population of over 1,000,000 people with nature. Responsibilities would include planning and implementation of the environmental education program, special events, and a comprehensive visitor services program. This project would also result in the development and updating of brochures, such as a refuge bird list, interpretive, educational, and outreach material, and planning of public use facilities, such as informational kiosks, wildlife interpretive trails, and observation platforms. Responsibilities will also include coordination of the following programs: Volunteers, Friends Groups, Cooperating Associations, partnerships, and administering the recreation fee program.
Estimated cost $114,439
(Linkages: Cache River NWR Objectives 3-5, 3-7, 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 5-1 and 5-2)

Office Assistant, GS-6
Enhance visitor services and operations for 140,000 annual visitors on Cache River NWR. This 66,500-acre refuge, declared a “Wetland of International Importance,” has become an extremely popular location for visitors participating in fishing, hunting, wildlife observation, and photography. The refuge office receives many visitors requesting information concerning the recreational opportunities, literature, maps, and other inquiries that are necessary to ensure a quality experience while visiting the refuge. Currently, the refuge has no staff solely dedicated to assisting with these visitor requests and maintaining associated databases. This project will provide an Office Assistant to answer the phones, update refuge web site, greet visitors, provide assistance with recreational fee programs, and provide refuge literature and other available information to more than 140,000 refuge visitors per year.
Estimated cost $69,584
(Linkages: Cache River NWR Objectives 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 5-1 and 5-2)

Park Ranger, Law Enforcement, GS-9
Provide one full-time law enforcement officer to protect wildlife, lands, facilities, employees, and the general public on Cache River NWR. Director’s Order #155 requires the Service to reduce dependency on dual-function refuge officers and progress towards a fulltime officer workforce. This officer will assist in fulfilling these needs by placing an officer in the field full time to protect wildlife and habitat resources and visitors. Illegal activities including farming trespass, theft, vandalism, poaching, artifact hunting, use and manufacture of controlled substances, and other violations of refuge regulations are increasing on refuge lands. Current law enforcement staff is unable to handle this workload and a growing number of violations are not enforced due to inadequate law enforcement staffing levels. Law enforcement is the most basic form of wildlife management and this project will dedicate a fulltime law enforcement officer to conserve and protect wildlife and wildlife habitats, and protect refuge visitors.
Estimated cost $97,292
(Linkages: Bald Knob NWR Objectives 3-5, 4-1, 5-1; Big Lake NWR Objectives 3-5, 4-1, 5-1; Cache River NWR Objectives 3-7, 4-1, 5-1; and Wapanocca NWR Objectives 3-5, 4-1, 5-1)

Environmental Education/Visitor Center
Plan and design an environmental education/visitor center for the Central Arkansas NWR Complex at a suitable site on existing or newly acquired refuge lands within easy access of I-40 or Highway 64, or at the existing headquarters site, whichever is deemed most feasible and desirable, to provide an adequate facility to educate the public about the Refuge System and the Complex, provide appropriate environmental education programs and curricula, provide visitor services, and enable proper administrative functions.

Construct a facility that would adequately meet the needs of the public and the staff. A project for an environmental education/visitor center is in the Region's 5-year construction plan and is estimated to cost approximately $4 to $6 million. The proposed facility would be approximately 3,500 to 4,500 square feet in size, and would include staff offices, conference room, auditorium, environmental class rooms, exhibit and display areas, break room, staff and public restrooms, secure law enforcement storage, utility/storage closets, fax/photocopy/file rooms, mudroom, bookstore, friends group office, and volunteer/receptionist office. This facility would be fully ADA-compliant and would enable suitable opportunities for visitor reception, environmental education, interpretation, and public meetings. The building design would incorporate greening features, including energy- conserving lighting, HVAC and insulative qualities, water-conserving systems, and alternate energy. The building would be designed and constructed to reduce its carbon footprint and lessen environmental impacts, and also would provide a safe and comfortable environment for staff and visitors. Additionally, there would be sites for interpretive foot trails, wayside exhibits, and outdoor kiosks.
Estimated cost: $4,500,000.
(Linkages: Cache River NWR Objectives 4-2, 4-6, 4-7, 5-1, and 5-3)

Wapanocca NWR

2007741429 – Headquarters/Visitors Center
Funding has been obtained through the ARRA for replacement of the existing headquarters/visitor contact station with a new facility. The proposed facility would be 1-story, approximately 2,500 square feet in size, and would include four staff offices, conference room, breakroom, unisex staff restroom, law enforcement storage, utility/storage closets, fax/photocopy/file room, mudroom, separate male/female public restrooms, an exhibit area, and volunteer/receptionist area. This facility would be fully ADA-compliant, would provide adequate administrative function, and would enable suitable opportunities for visitor reception and interpretation. The building design would incorporate greening features, including energy-conserving lighting, HVAC and insulative qualities, water-conserving systems, and options for alternate energy. It also would provide a safe and comfortable environment for staff and visitors. The current office would be removed and the new headquarters/visitor contact station would be sited within close proximity to the current building within the existing office/maintenance shop grounds, which are already disturbed; therefore, new construction would necessitate minimal site disturbance and no wildlife habitat would be destroyed. Funding amount would include planning/design, engineering, construction, furniture, and interpretive exhibits.
Estimated cost: $650,000.
(Linkages: Wapanocca NWR Objectives 4-2, 4-6, 4-7, 5-1, and 5-3)

2007701839 – Nature Drive Road
Nature Drive Road is used by more than 30,000 visitors per year on Wapanocca NWR. The gravel layer is adequate with only the need for spot replacement. The crown of the road needs to be improved, and repairs are needed to correct washboarding, slight ruts, and potholes. The road ditches need to be cleaned out. Completion of this project will enable visitors to travel this road even in adverse conditions.
Estimated cost $60,000
(Linkages: Wapanocca NWR Objectives 4-2, 4-3, 4-4, 4-5, 4-6 and 4-7)

2007733003 – Driver's Bridge
Driver's Bridge provides the only crossing for refuge visitors and staff to the east side of the refuge. The bridge is inadequate to safely support refuge and heavy equipment used for cooperative farming that must cross to reach east side of the refuge to conduct management activities. The bridge has no safety guardrails to prevent vehicles and equipment from sliding off the bridge surface. This project

will provide for engineering design, planning, and construction of a new 26' x 80' replacement bridge conforming to Federal Highway Administration safety regulations.
Estimated cost $200,000
(Linkages: Wapanocca NWR Objectives 2-1, 2-2 and 4-2)

2005219850 – Public Use Parking Lot
Heavy use by hunters, bird watchers, and other nature observers has caused deterioration in all the refuge's public use parking lots. Use during wet times of the year have caused potholes in gravel lots and cracks in the paved areas. Rehabilitation of all parking areas is required in order to provide quality parking areas for the public, ensure public safety, and comply with ADA standards.
Estimated cost $30,000
(Linkages: Wapanocca NWR Objectives 4-2, 4-3, and 4-5)

2007733009 – Boat Launch and Boardwalk
This boat launch provides the only available public boat ramp and access area to Wapanocca Lake and is enjoyed by more than 15,000 refuge visitors per year who participate in boating, canoeing, fishing, and wildlife watching. The railing on the boat dock is damaged and the ramp area is eroding along the slope. Replacement of unsafe railing will provide boat launchers with a safe area in which to launch and dock boats and other permitted water vessels while pursuing wildlife-dependent recreational opportunities. Rip rap will be applied to the sides of the bank to protect from erosion.
Estimated cost $125,000
(Linkages: Wapanocca NWR Objectives 4-2, 4-4, and 4-5)

Park Ranger, Visitor Services Specialists, GS-9
Wapanocca NWR is situated within the Memphis Metropolitan Area, which has an estimated population of 1,280,533. Big Lake NWR is located between population centers at Manila and Blytheville and about 1 hour from Jonesboro, Arkansas. This project will directly combat the steadily increasing percentage of the population that are disconnected from nature. A Visitor Services specialist will be hired to plan and implement a well-rounded visitor services program on Wapanocca and Big Lake NWRs. The visitor services program will include development of an environmental outreach program targeting urban families, groups, and individuals who are unaware or uninterested in the natural surroundings that these refuges offer. Interpretive programs will be developed that promote self-exploration of refuge lands to enhance the visitor's connection with nature. In addition, the Visitor Services specialist will develop outreach programs with neighboring communities for recruitment of volunteers, development of Friends Groups, and fostering cooperative partnerships with neighboring environmental support groups will be a priority. Visitor center staffing, planning and conducting special events, and managing the sign programs are other duties required.
Estimated cost $94,588
(Linkages: Big Lake NWR Objectives 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 5-1, 5-2; and Wapanocca NWR Objectives 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 5-1, 5-2)

REFUGE ADMINISTRATION

Bald Knob NWR

Supervisory Wildlife Specialist, GS-11
Hire a supervisory wildlife specialist to assist in day-to-day operations of Bald Knob NWR, which includes implementing an expanding public use program. The supervisory wildlife specialist also will coordinate facilities, habitat management, and maintenance projects, and will assist with procurement, data management, supervision of other staff, and public outreach. This refuge, which

has been identified as an Important Bird Area, provides critical habitat for 500,000 plus wintering waterfowl and thousands of migrating shore and wading birds in late summer and early fall.
Estimated cost $114,439
(Linkages: Bald Knob NWR Objectives 5-1, 5-2, and 5-3)

Big Lake NWR

Laborer, WG-4
Hire a laborer at Big Lake NWR to assist the staff in completion of routine and preventive maintenance on refuge grounds, equipment, facilities, and support structures. The refuge has large electronically controlled water control structures that require routine maintenance, annual painting, and vegetation control. In addition to the demands of operating and maintaining water control infrastructure, the laborer will perform preventive maintenance and repair of grounds, facilities, and vehicles. The laborer will also assist with the daily supervision of a 4-person Youth Conservation Corp work crew by preparing daily work assignments and safety oversight during work duties, as well as work with volunteers to perform needed light maintenance tasks. This project will allow the refuge to reach full potential while addressing a backlog of maintenance needs and promoting volunteer work opportunities.
Estimated cost $56,610
(Linkages: Big Lake NWR Objectives 3-1, 3-3, 5-1, 5-2, and 5-3)

Cache River NWR

Renovate Cache River Headquarters interior
This project will enable renovation to the interior of the Cache River NWR Headquarters building. The building is a converted farm house that was constructed in 1964 and needs numerous repairs and updates to accommodate the current refuge staff, refuge visitors, and become ADA compliant. The project will include updating the electrical wiring, painting of walls and ceilings, replacing light fixtures, replacing worn carpet, replacing toilet fixtures, replacing linoleum floor surfaces, kitchen cabinets, countertops, and central heating and air conditioning system.
Estimated cost $80,000
(Linkages: Cache River NWR Objectives 5-1 and 5-3)

Replace roof and exterior siding on Cache River Headquarters building
This project will provide a new roof and exterior siding on the Cache River NWR Headquarters building. The building is an old farm house (constructed in 1964) that was converted to a refuge headquarters upon purchase of the property by the Service in 1991. The roof is well worn and leaks during heavy sustained rain events, causing damage to interior surfaces. The exterior of the building is covered with vinyl siding, which has deteriorated and separated from the building side surfaces in many areas. This project will provide for a complete tear off of the existing roof, replace damaged decking, and installation of new shingles or metal roof. Exterior siding will be removed and energy-efficient insulation and new vinyl siding will be installed.
Estimated cost $105,000
(Linkage: Cache River NWR Objectives 5-1 and 5-3)

Supervisory Wildlife Specialist, GS-11
This project will provide administrative and biological assistance on Cache River NWR. This refuge has been identified as the most important area in the Mississippi Flyway for wintering Mallards and has been identified as one of only twenty-two “Wetlands of International Importance” within the United States. Refuge staff have been involved in the protection, management, and restoration of habitat to benefit both migratory birds and a variety of native wildlife species. Critical wildlife and habitat

surveys and associated administrative work on the refuge must be undertaken to assess the impact of habitat management actions identified within the approved refuge Habitat Management Plan. Assistance will be provided with administrative duties, supervision of maintenance staff and operations, biological functions, public use programs, outreach efforts, and data management on this bottomland hardwood refuge. Wildlife that will benefit includes over 200 species of migratory songbirds, 50 species of mammals, and 45 species of reptiles.
Estimated cost $114,439
(Linkages: Cache River NWR Objectives 1-1, 4-1, 5-1, and 5-3)

Facilities Operations Specialist, GS-11
This project will provide enhanced facilities and maintenance operations on the refuge and complex. This refuge, declared a "Wetland of International Importance," contains over 200 assets, which require annual inspection and documentation of necessary maintenance needs and operations cost. This project will provide assistance and support for utilizing the Complex's Service Asset Management and Maintenance System (SAMMS), computerized maintenance management software application to track maintenance expenditures, identify maintenance needs, quantify maintenance activities, and report maintenance accomplishments. In addition to maintenance system needs, this position will provide administrative support to the Complex for maintaining the Complex Real Property Inventory, personal property databases, and will serve as the refuge's collateral duty safety officer and be responsible for conducting annual safety inspections, identifying and correcting safety deficiencies, and conducting safety meetings. Refuge environmental audits will also be coordinated through the facilities operations specialist.
Estimated cost $114,439
(Linkages: Cache River NWR Objectives 5-1 and 5-3)

Wapanocca NWR

2007741447 – Maintenance Shop
Maintenance of all refuge equipment is performed in this shop. Current issues include a leaking roof which allows water to seep into walls, at one point near an electrical panel. If continued deterioration persists, the shop will be damaged to a point requiring major repairs. This project will replace the roof, correct water damage, and provide updates to wiring and other systems to meet energy and safety codes.
Estimated cost $ 75,000
(Linkages: Wapanocca NWR Objectives 5-1 and 5-3)

2007733004 – Vehicle Storage Building
This building provides inside storage, protection, and security for refuge vehicles, light maintenance equipment, and other items that cannot be stored outside in the elements. Shingles and gutter system have reached their useful life span and need to be replaced to prevent major water leaks and additional costly damage to the interior area of this storage facility. This project will include the removal of existing shingles and dilapidated gutter system and replace with new 30-year type fiberglass shingles and drainage system to promote water drainage away from storage facilities. This project will benefit the refuge by ensuring that the vehicles, light equipment, and other items requiring adequate storage facilities are protected from the outside elements, which will prevent pre-mature deterioration and replacement.
Estimated cost $50,000
(Linkage: Wapanocca NWR Objective 5-3)

Table 13. Summary of Projects

	PROJECT TITLE	COST
	FISH AND WILDLIFE POPULATION MANAGEMENT	
2007732682	Granary East Canal	$ 85,000
2007716105	300 Acre Field Culvert Crossing	$ 60,000
2005204594	Low Road	$ 60,000
FY08-3367	Bald Knob, Biological Technician, GS-7	$ 77,321
	Rehabilitate Dixie Unit South Water Control Structure	$ 27,000
	Rehabilitate Dixie Unit North Water Control Structure	$ 40,000
FY08-4234	Howell Tract Impoundment Restoration	$165,556
FY08-4241	Plunkett Farm Waterfowl Sanctuary Enhancement	$ 50,800
FY08-2595	Cache River, Biological Technician, GS-7	$ 77,321
FY08-3089	Cache River, Engineering Equipment Operator, WG-8	$ 77,650
FY08-1963	Cache River, Ecologist, GS-11	$114,439
FY08-4128	Grassland Restoration	$105,062
FY08-4421	Bottomland Hardwood Restoration	$137,482
	HABITAT MANAGEMENT	
	Expand Bald Knob NWR Maintenance Shop/Equipment Storage Shed	$100,000
2007716161	Little Red River Protection Levee	$320,000
2007716106	Replace Middle 1,000-Acre Field Entrance Crossing	$ 45,000
FY08-3373	Bald Knob, Laborer, WG-4	$ 56,610
FY08-3378	Bald Knob, Engineering Equipment Operator, WG-8	$ 77,650
	Replace Big Lake NWR Maintenance Shop/Equipment Storage Shed	$590,000
FY08-3179	Big Lake, Biological Technician, GS-7	$ 77,321

	PROJECT TITLE	COST
	Repair Damaged Plunkett Farm Unit Water Control Structure	$ 25,000
	Reconstruct Bank of Brinkley Levee and Moist-Soil Unit Impoundments	$ 80,000
FY08-4220	Cache River NWR Stream Restoration	$170,640
FY08-3085	Cache River, Forestry Technician, GS-7	$ 77,321
FY08-3091	Cache River, Assistant Forester, GS-11	$114,439
	Cache River, Laborer, WG-4	$ 56,610
2007733000	Replace Big Creek Bridge	$200,000
200733030	Rehabilitate County Ditch 4 Drainage Ditch	$150,000
FY08-3140	Wapanocca, Biological Technician, GS-7	$ 77,321
	RESOURCE PROTECTION	
2007716155	Repair Ditch 81 Levee	$200,000
FY08-3316	Restore Ecosystem Health and Natural Hydrology	$240,000
FY08-3341	Reduce Invading American Lotus to less than 30% of Open Water	$ 65,000
FY08-3353	Enhance Seasonal Water Level Management	$250,000
FY08-3197	Big Lake, Hydrologist, GS-11	$114,439
FY08-3101	Cache River, Realty Specialist, GS-12	$137,165
2006558819	Dredge Ditch 8	$875,000
2006557060	Rehabilitate Ditch 2	$300,000
2007716250	Rehabilitate Levee 5 Water Control Structure	$125,000
FY08-3167	Wapanocca, Engineering Equipment Operator, WG-8	$ 77,650
FY08-3191	Wapanocca, Laborer, WG-4	$ 56,610
	VISITOR SERVICES	
	Bald Knob, Park Ranger (Visitor Services), GS-9	$94,588

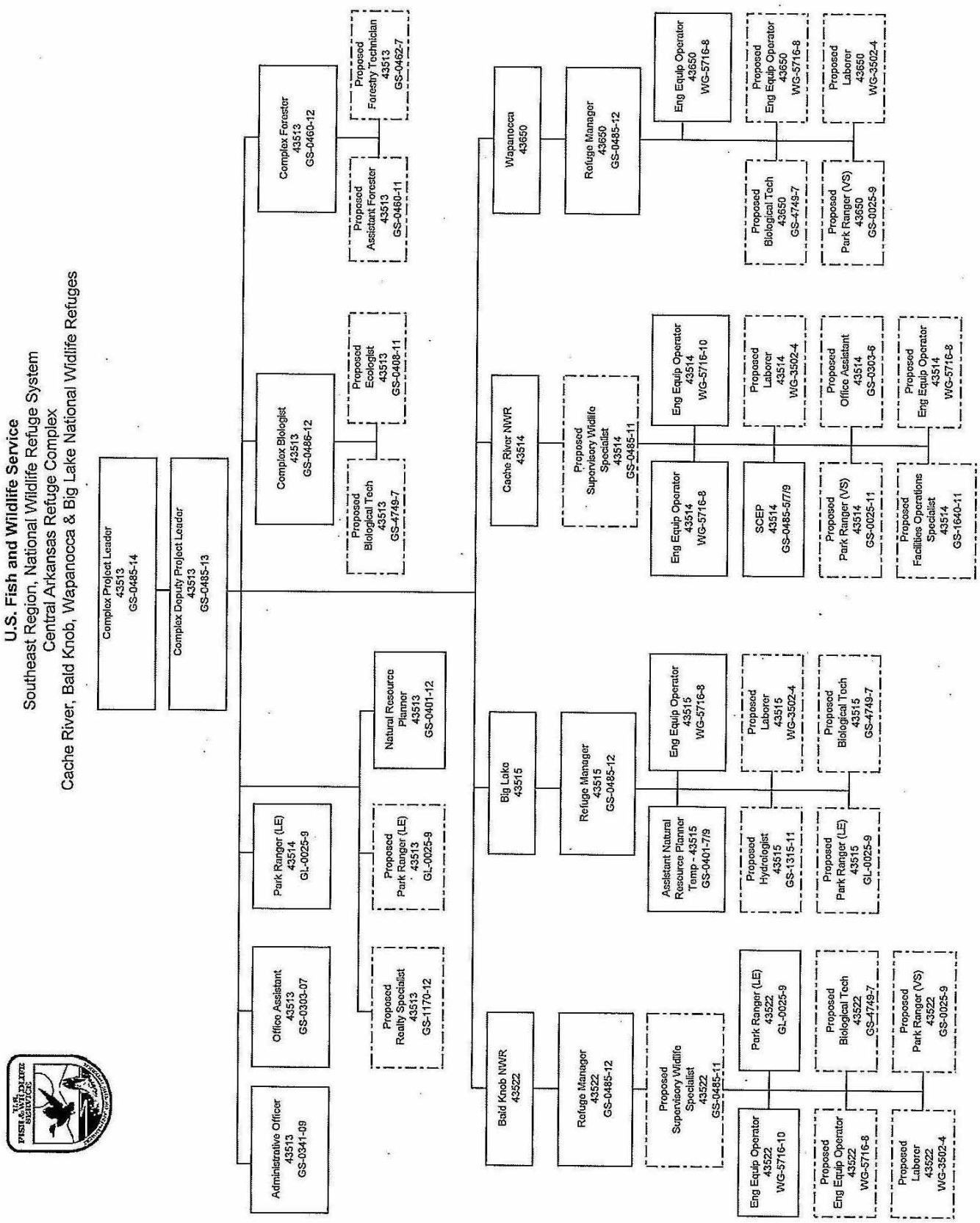
	PROJECT TITLE	COST
2007732649	Replace Bald Knob Office Trailer	$650,000
04134134	Rehabilitate Bottom 300-Acre Field Road	$100,000
2005218680	Improve Mingo Creek Access Road	$200,000
2007716141	Replace Main Entrance Gates	$ 20,000
2007733603	Replace Big Lake NWR Office Building with Headquarters/Visitor Contact Station	$650,000
2007716164	Repair Wall and Sidewalk at Timm's Point Observation Area	$100,000
2007733607	Repair Ditch 28 Bridge	$300,000
2005207265	Improve Timm's Point Parking Area	$ 75,000
2006531982	Improve Big Lake Bank Fishing Parking Area	$ 50,000
2006557432	Improve Ditch 81 Levee Road Parking Area	$ 15,000
2007716115	Repair and Reinforce Brights Landing Fishing Pier	$ 20,000
2005222810	Rehabilitate Wildlife Auto Drive	$900,000
2006531558	Improve Brights Landing Accessible Parking Area	$ 75,000
2006531978	Improve Headquarters Visitor's Parking Area	$100,000
2006531989	Rehabilitate Oak Island Parking Area	$ 25,000
2006531992	Improve Handicapped Parking Area	$ 25,000
FY08-3329	Improve Educational and Interpretive Material to Connect People to Nature	$150,000
FY08-3156	Big Lake, Park Ranger (Law Enforcement), GS-9	$ 97,292
	Construct Environmental Education/Visitor Center for Central Arkansas NWR Complex	$ 4,500,000
03125419	Rehabilitate Gin Lane South Road	$160,000
	Replace Worn Refuge Boundary Signs	$ 25,000
2005253254	Rehabilitate Cache Bayou Road	$180,000
2005204642	Rehabilitate Horseshoe Lake Road	$120,000

	PROJECT TITLE	COST
2005202117	Rehabilitate Robinson Tract East Road	$ 50,000
2005202761	Rehabilitate Robinson Tract West Road	$ 50,000
	Rehabilitate Unsafe Horseshoe Lake Boat Ramp and Parking Area	$ 15,000
FY08-1938	Cache River, Park Ranger (Visitor Services), GS-11	$114,439
FY08-3238	Cache River, Office Assistant, GS-6	$ 69,584
FY08-3395	Cache River, Park Ranger (Law Enforcement), GS-9	$ 97,292
2007741429	Replace Wapanocca NWR Office with Headquarters/Visitor Contact Station	$650,000
2007701839	Repair Nature Drive Road	$ 60,000
2007733003	Replace Driver's Bridge	$200,000
2005219850	Rehabilitate Public Use Parking Lot	$ 30,000
2007733009	Rehabilitate Boat Launch and Boardwalk	$125,000
FY08-3117	Wapanocca, Park Ranger (Visitor Services), GS-9	$ 94,588
	ADMINISTRATION	
FY08-3385	Bald Knob, Supervisory Wildlife Specialist, GS-11	$114,439
FY08-3293	Big Lake, Laborer, WG-4	$ 56,610
	Renovate Cache River Headquarters Interior	$ 80,000
	Replace Roof & Exterior Siding on Cache River HQ Building	$105,000
FY08-3875	Cache River, Supervisory Wildlife Specialist, GS-11	$114,439
FY08-3210	Cache River, Facilities Operations Specialist, GS-11	$114,439
2007741447	Repair Maintenance Shop	$ 75,000
2007733004	Repair Vehicle Storage Building	$ 50,000
TOTAL		$10,294,121

FUNDING AND PERSONNEL

Existing Positions	Annual Costs Existing Positions
Complex Project Leader, GS-14	$149,908
Complex Deputy Project Leader, GS-13	$126,865
Complex Administrative Officer, GS-9	$ 73,569
Complex Office Assistant, GS-7	$ 60,138
Complex Park Ranger (Law Enforcement), GS-9	$ 75,671
Complex Biologist, GS-12	$106,684
Complex Forester, GS-12	$106,684
Complex Natural Resource Planner, GS-12	$106,684
Bald Knob Refuge Manager, GS-12	$106,684
Bald Knob Engineering Equipment Operator, WG-10	$ 63,977
Bald Knob Park Ranger (Law Enforcement), GS-9	$ 75,671
Big Lake Refuge Manager, GS-12	$106,684
Big Lake Engineering Equipment Operator, WG-8	$ 56,987
Big Lake Asst. Natural Resource Planner, GS-7 (Temporary)	$ 60,138
Cache River SCEP (Student Career Experience Program), GS-9	$ 73,569
Cache River Engineering Equipment Operator, WG-8	$ 56,987
Cache River Engineering Equipment Operator, WG-10	$ 63,977
Wapanocca Refuge Manager, GS-12	$106,684
Wapanocca Engineering Equipment Operator, WG-8	$ 56,987
Sub-total – Salary for Existing Positions	$1,634,548
Proposed Positions	**Annual Costs Proposed Positions**
Complex Realty Specialist, GS-12	$137,165
Complex Park Ranger (Law Enforcement), GS-9	$ 97,292
Complex Biological Technician, GS-7	$ 77,321
Complex Ecologist, GS-11	$114,439

Complex Assistant Forester, GS-11	$114,439
Complex Forestry Technician, GS-7	$ 77,321
Bald Knob Park Ranger (Visitor Services), GS-9	$ 94,588
Bald Knob Supervisory Wildlife Specialist, GS-11	$114,439
Bald Knob Biological Technician, GS-7	$ 77,321
Bald Knob Engineering Equipment Operator, WG-8	$ 77,650
Bald Knob Laborer, WG-4	$ 56,610
Big Lake Hydrologist, GS-11	$114,439
Big Lake Park Ranger (Law Enforcement), GS-9	$ 97,292
Big Lake Biological Technician, GS-7	$ 77,321
Big Lake Laborer, WG-4	$ 56,610
Cache River Supervisory Wildlife Specialist, GS-11	$114,439
Cache River Office Assistant, GS-6	$ 69,584
Cache River Park Ranger (Visitor Services), GS-11	$114,439
Cache River Facilities Operations Specialist, GS-11	$114,439
Cache River Engineering Equipment Operator, WG-8	$ 77,650
Cache River Laborer, WG-4	$ 56,610
Wapanocca Biological Technician, GS-7	$ 77,321
Wapanocca Park Ranger (Visitor Services), GS-9	$ 94,588
Wapanocca Engineering Equipment Operator, WG-8	$ 77,650
Wapanocca Laborer, WG-4	$ 56,610
Total (Existing and Proposed)	$3,872,125


U.S. Fish and Wildlife Service
Southeast Region, National Wildlife Refuge System
Central Arkansas Refuge Complex
Cache River, Bald Knob, Wapanocca & Big Lake National Wildlife Refuges
Complex Project Leader 43513 GS-0485-14
Complex Deputy Project Leader 43513 GS-0485-13
Administrative Officer 43513 GS-0341-09
Office Assistant 43513 GS-0303-07
Park Ranger (LE) 43514 GL-0025-9
Natural Resource Planner 43513 GS-0401-12
Proposed Park Ranger (LE) 43513 GL-0025-9
Proposed Realty Specialist 43513 GS-1170-12
Complex Biologist 43513 GS-0486-12
Proposed Ecologist 43513 GS-0408-11
Proposed Biological Tech 43513 GS-4749-7
Complex Forester 43513 GS-0460-12
Proposed Forestry Technician 43513 GS-0462-7
Proposed Assistant Forester 43513 GS-0460-11
Bald Knob NWR 43522
Refuge Manager 43522 GS-0485-12
Proposed Supervisory Wildlife Specialist 43522 GS-0485-11
Eng Equip Operator 43522 WG-5716-10
Park Ranger (LE) 43522 GL-0025-9
Proposed Biological Tech 43522 GS-4749-7
Proposed Park Ranger (VS) 43522 GS-0025-9
Proposed Eng Equip Operator 43522 WG-5716-8
Proposed Laborer 43522 WG-3502-4
Big Lake 43515
Refuge Manager 43515 GS-0485-12
Assistant Natural Resource Planner Temp - 43515 GS-0401-7/9
Eng Equip Operator 43515 WG-5716-8
Proposed Hydrologist 43515 GS-1315-11
Proposed Laborer 43515 WG-3502-4
Proposed Park Ranger (LE) 43515 GL-0025-9
Proposed Biological Tech 43515 GS-4749-7
Cache River NWR 43514
Proposed Supervisory Wildlife Specialist 43514 GS-0485-11
Eng Equip Operator 43514 WG-5716-8
Eng Equip Operator 43514 WG-5716-10
SCEP 43514 GS-0485-5/7/9
Proposed Laborer 43514 WG-3502-4
Proposed Park Ranger (VS) 43514 GS-0025-11
Proposed Office Assistant 43514 GS-0303-6
Proposed Facilities Operations Specialist 43514 GS-1640-11
Proposed Eng Equip Operator 43514 WG-5716-8
Wapanocca 43650
Refuge Manager 43650 GS-0485-12
Eng Equip Operator 43650 WG-5716-8
Proposed Biological Tech 43650 GS-4749-7
Proposed Park Ranger (VS) 43650 GS-0025-9
Proposed Eng Equip Operator 43650 WG-5716-8
Proposed Laborer 43650 WG-3502-4

Partnership Opportunities

Central Arkansas NWR Complex has historically partnered with many other agencies and organizations to improve management of the refuges. It is anticipated that these partnerships will continue and opportunities to develop additional partnerships will be pursued. Partnerships are critical for the refuges to fulfill their purposes, achieve their goals, objectives, and strategies, leverage funds, minimize costs, and bridge relationships with others.

The refuges have cooperated with the following federal agencies: Federal Bureau of Investigation, Federal Highway Administration, U.S. Army Corps of Engineers Little Rock District, U.S. Army Corps of Engineers Memphis District, U.S. Fish and Wildlife Service Division of Law Enforcement, U.S. Fish and Wildlife Service Division of Migratory Birds, U.S. Fish and Wildlife Service Ecological Services, U.S. Geological Survey, U.S. Geological Survey National Wetland Research Center, U.S. Geological Survey Patuxent Wildlife Research Center, USDA Farm Service Agency, USDA Forest Service, and USDA Natural Resources Conservation Service.

The refuges have cooperated with the following state agencies: Arkansas Cooperative Fish and Wildlife Research Unit, Arkansas Department of Environmental Quality, Arkansas Forestry Commission, Arkansas Game and Fish Commission, Arkansas Natural Heritage Commission, Arkansas Natural Resources Commission, Arkansas State Historic Preservation Office, Arkansas State Police, Arkansas Transportation and Highway Department, Louisiana Cooperative Fish and Wildlife Research Unit, and Missouri Department of Conservation.

The refuges have cooperated with the following Local agencies: Blytheville Chamber of Commerce; Blytheville Tourism Council; County Judges of Crittenden, Jackson, Monroe, Mississippi, Prairie, White, and Woodruff Counties, Arkansas; Sheriff Departments of Crittenden, Jackson, Monroe, Mississippi, Prairie, White, and Woodruff Counties, Arkansas; and Manila Volunteer Fire Department.

The refuges have cooperated with the following universities: Arkansas Northeastern Community College, Arkansas State University, Arkansas Tech University, Cornell Laboratory of Ornithology, Harding University, Mississippi State University, Southern Illinois University, University of Arkansas (Fayetteville, Monticello, and Pine Bluff), University of Memphis, and University of Missouri Gaylord Memorial Laboratory.

The refuges have cooperated with the following non-governmental organizations/agencies: Audubon Arkansas, Blytheville First Baptist Church, Cache River/Bayou DeView Improvement District, Delta Waterfowl, Ducks Unlimited, Environmental Synergy Incorporated, Friends of Big Lake, Friends of Felsenthal, Friends of White River, Greenbrier Wetland Consultants, Little Red River Drainage District, National Wild Turkey Federation, National Tree Trust, Manila Kiwanis Club, Manila Lions Club, Manila United Methodist Church, The Nature Conservancy, Volunteers of Big Lake, and White River Levee District of Woodruff, Prairie, and Monroe Counties.

No Friends Groups exist within the Complex, but each refuge will be working to establish a Friends Group as soon as possible. Each refuge in the Complex has enlisted the assistance of volunteers to help with operations and programs; however, each refuge will be working to expand volunteer opportunities and increase their cadre of volunteers.

STEP-DOWN MANAGEMENT PLANS

A comprehensive conservation plan is a strategic plan that guides the overall direction and administration of the refuge. A step-down management plan provides specific guidance on activities, such as habitat, fire, and visitor services. These plans (Table 14) 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 14. Central Arkansas National Wildlife Refuge Complex step-down management plans related to the goals and objectives of the comprehensive conservation plan

Step-down Plan	Fiscal Year Proposed Completion/Revision Date
Cropland Management (except Big Lake NWR)	2012
Cultural Resources	2019
Fire Management/Fire Effects Monitoring	2018
Fisheries Management	2017
Fishing	2013
Habitat Management	2015
Hunting	2013
Hurricane/Disaster Action	2010
Invasive, Exotic, and Nuisance Plant/Animal	2011
Inventory/Monitoring	2015
Law Enforcement	2013
Pesticide Use	2011
Safety	2011
Visitor Services	2016
Volunteers, Friends, and Partnerships	2016
Water Management	2015
Wilderness Management (Big Lake NWR only)	2010

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 evolving information. More specifically, adaptive management is a process by which projects are implemented within a framework of scientifically driven experiments to test the predictions and assumptions outlined within a plan.

To apply adaptive management, specific surveying, inventorying, and monitoring protocols will be adopted for the refuges. 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, priority species or communities, then alterations to the management projects will be formulated and implemented. Subsequently, the CCP will be revised. Specific monitoring and evaluation activities will be described in the step-down management plans.

PLAN REVIEW AND REVISION

This CCP will be reviewed annually as the refuges' annual work plans and budgets are developed. It will also be reviewed to determine the need for revision. A revision will occur if and when conditions change or significant information becomes available, such as a change in ecological conditions or a major refuge expansion. The final 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 as appropriate.

SECTION B. ENVIRONMENTAL ASSESSMENT

I. Background

INTRODUCTION

The U.S. Fish and Wildlife Service (Service) prepared this Environmental Assessment (EA) for the Central Arkansas National Wildlife Refuge Complex (Complex), which is comprised of Bald Knob, Big Lake, Cache River, and Wapanocca NWRs in compliance with the National Environmental Policy Act (NEPA) and the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act). The Improvement Act requires the development of comprehensive conservation plans for all national wildlife refuges. Following a public review and comment period on the Draft CCP, a final decision will be made by the Service that will guide management actions and decisions on Bald Knob, Big Lake, Cache River, and Wapanocca NWRs over the next 15 years, provide a greater understanding about the refuges and their 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 Complex, and satisfies the legislative mandates of the Improvement Act and the purposes for which the refuges were established. While the plan provides general overall management direction, subsequent step-down plans will provide more detailed management strategies and actions.

The EA identifies 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 economic impacts of implementing each alternative are analyzed. This analysis assists the Service in determining if the alternatives represent no significant impacts, thus requiring the preparation of a Finding of No Significant Impact (FONSI), 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 Service will select an alternative to be fully developed for the four refuges.

This plan is needed to address current management issues, to provide long-term management direction for the refuges, and to satisfy the legislative mandates of the Improvement Act, which requires the preparation of a CCP for all national wildlife refuges.

PURPOSE AND NEED FOR ACTION

This EA addresses a 15-year CCP for the Complex that provides guidance for future refuge management and meets the requirements of the Improvement Act.

The EA is needed to set forth and evaluate a range of reasonable management alternatives for these 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 will select an alternative to be fully developed for these refuges.

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 their probable consequences, and selected Alternative C as the proposed management action. In the opinion of the Service and the planning team, Alternative C is the best approach to guide the refuges' future direction.

There is no current plan that identifies priorities and ensures consistent and integrated management of these refuges, thus necessitating the need for this plan. The Improvement Act requires that all national wildlife refuges have a CCP by 2012.

The purpose for the EA is to ensure the four refuges in the Complex continue to provide sanctuary and wetlands for migratory birds; conserve, restore, and enhance fish and wildlife resources; serve as breeding grounds for native birds; and provide appropriate, compatible public uses.

DECISION FRAMEWORK

Based on the assessment described in this document, the Service will select an alternative to implement the CCP for the Complex. The finalized plan 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 Refuge System missions, the purpose(s) for which the refuges were established, and other legal mandates. Assuming no significant impact is found, implementation of the CCP will begin immediately, will be monitored annually, and will be revised on a 15-year planning cycle, or sooner if necessary.

PLANNING STUDY AREA

The planning study area includes the four refuges in the Central Arkansas NWR Complex. These refuges are all located in the Lower Mississippi Valley. Two of the Refuges – Big Lake and Wapanocca NWRs – are situated just west of the Mississippi River itself, within the alluvial valley. The other two refuges – Bald Knob and Cache River NWRs– are located 50-60 miles to the west, in the watershed of the Cache River, a tributary of the Mississippi River. The surrounding land use for all four refuges is predominantly agriculture.

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

AUTHORITY, LEGAL COMPLIANCE, AND COMPATIBILITY

The Service developed this CCP in compliance with the Improvement Act and Part 602 of the Fish and Wildlife Service Manual (National Wildlife Refuge System Planning). The actions described within this plan also meet requirements of NEPA. The refuge staff achieved compliance with NEPA through the involvement of the public and the incorporation of an EA in the Draft CCP, with a description of the alternatives and an analysis of their environmental consequences (Chapters III and IV in this section). Full implementation of the CCP will enable the Service to achieve the vision and purposes of the four refuges within the Complex.

The CCP's overriding consideration is to enable fulfillment of the purposes for which the refuges were established. The laws that established the refuges and by which funds for acquisitions were authorized also establish their purposes. Conservation and management of trust fish, wildlife, and habitat resources are the first priorities in refuge management, and the Service allows and

encourages wildlife-dependent recreation, as long as it is compatible with, or does not detract from, the mission of the Refuge System and purposes for which the refuges were established.

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 is "A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge." In addition, "wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety."

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 the Complex. This Draft CCP/EA has been formulated with input and assistance from interested citizens, conservation organizations, and employees of local, state, and federal agencies. The participation of these stakeholders and their ideas has been of great value in setting the management direction for the four refuges in the Complex. The Service, as a whole, and the Complex staff, in particular, are very grateful to everyone 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 Bald Knob, Big Lake, Cache River, and Wapanocca NWRs.

In preparation for the CCP process, the Complex conducted two biological reviews and two visitor services reviews. The first biological review was held for Big Lake and Wapanocca NWRs in October-November 2006. In May 2007, another biological review was held for Bald Knob and Cache River NWRs. Comprised of diverse Service and non-Service resource specialists, both review teams examined existing wildlife and habitat programs on the four refuges and made recommendations (in the form of goals, objectives, and strategies) to consider in guiding future efforts. The CCP planning team closely considered, and frequently used, these goals, objectives, and strategies in drafting the CCP.

Also in 2007, the Complex conducted two visitor services reviews encompassing all four refuges. Service staff that specialize in public use and visitor services participated in these two reviews and provided their expertise and experience in making a number of recommendations for the visitor services programs at all four refuges in the Complex.

Big Lake and Wapanocca NWRs public scoping meetings were held on February 26, 2007, with 10 people attending, and on February 27, 2007, with two attendees, respectively. Three public scoping meetings for Bald Knob and Cache River NWRs were held on September 24, 25, and 26, 2007. Five, ten, and seven people attended each meeting, respectively. The Service received a number of comments concerning issues such as water quality, water flow, bank stabilization, land acquisition, habitat management, hunting, camping, access, wildlife observation and photography, special programs for youth and the elderly, staffing, communication with the public, law enforcement, facilities, and water management. These comments are included in Chapter III of the CCP (Section A).

II. Affected Environment

For a description of the affected environment, please refer to 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 each of the four refuges' purpose and vision, the goals identified in the CCP, the priorities and goals of the LMRE team, the goals of the Refuge System, and the mission of the Service. Additionally, alternatives are formulated to address the significant issues, concerns, and problems identified by the Service, its partners, and the public during the scoping process.

The three alternatives, identified and evaluated in the EA, represent different approaches that could be implemented to accomplish permanent protection, restoration, and management of the refuges' fish, wildlife, plants, habitats, and other resources, as well as compatible wildlife-dependent recreation. Complex staff assessed the biological conditions and analyzed the external relationships affecting the refuges. This essential information contributed to the development of the goals and helped staff formulate the alternatives. As a result, each alternative presents different sets of objectives for reaching Complex and refuge goals within the approximate 15-year time frame of the CCP. Each alternative evaluation was based on progress that could be expected within the planning time frame and how 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 15.

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 approaches for managing the refuges over a 15-year time frame, while still meeting the refuges' purposes and goals. The three alternatives are summarized below. A comparison of each alternative follows the general description.

ALTERNATIVE A – CURRENT MANAGEMENT (NO ACTION)

Under Alternative A, the "no action" alternative, management of the Complex would not change from current management. The refuges would be expanded as feasible and desirable within approved acquisition boundaries.

The Complex would continue to restore, protect, and manage habitat, with focus on the following habitat categories:

- Bottomland hardwood forest
- Wetlands
- Cropland units
- Moist-soil units
- Open water
- Grassland/shrub habitats
- Wilderness Area (Big Lake NWR only)

Management would continue to focus on:

- Acquisition of lands from willing sellers within currently approved acquisition boundaries
- Improving forest habitat for wildlife
- Afforestation and reforestation
- Restoration of wetlands
- Invasive plant and nuisance animal management
- Cooperative farming
- Inventorying and monitoring
- Priority public uses (e.g., Hunting, Fishing, Wildlife Observation, Wildlife Photography, and Environmental Education and Interpretation)

The details of this alternative are summarized in Table 15.

ALTERNATIVE B – MINIMAL MANAGEMENT

Under Alternative B, the Complex would not perform active wildlife or habitat management over the 15-year cycle of the CCP. In this "let nature take its course" alternative, there would be no reforestation, no moist-soil or cropland management, no road maintenance, and no beaver dam removal. Natural succession would be allowed to proceed unchecked, providing for early stage or successional habitat in previously manipulated areas, such as moist-soil units, croplands, or grasslands. Invasive plants and nuisance animals would not be controlled, wetland restoration projects would not be implemented, and forest and other habitats would not be enhanced for priority wildlife species. There would be no change in the acreage or amount of waterfowl sanctuaries. Roadways would neither be mowed nor maintained, facilities and infrastructure would not be improved, and visitor services would be diminished overall.

In sum, under this alternative, all four refuges in the Complex would implement a passive stewardship approach to management of habitats, but would monitor "natural" habitat succession and trends in wildlife populations over time. The details of this alternative are summarized in Table 15.

ALTERNATIVE C – ENHANCED HABITAT AND PUBLIC USE MANAGEMENT (PROPOSED ALTERNATIVE)

Under this alternative, habitat conservation and restoration programs would be increased through land acquisition projects from willing sellers. The refuges would intensify and expand forest, moist-soil, scrub-shrub, and grassland management programs in order to increase benefits for waterfowl, shorebirds, water birds, other migratory birds, and other species of native wildlife. Hydrologic, wetland, and forest restoration projects also would be expanded. Invasive plant and nuisance animal control projects would be increased. A full range of inventorying, monitoring, and research programs would be developed and implemented to enable adaptive management. Environmental education and interpretive programs would be developed and implemented. Opportunities for hunting, fishing, wildlife observation, and wildlife photography would be expanded, and law enforcement coverage would be increased for more effective protection of resources and visitors. The capacity and capability of the Complex to effectively administer and provide comprehensive public use programs would be increased with the replacement of existing office buildings and construction of new headquarters/visitor contact stations at Bald Knob, Big Lake, and Wapanocca NWRs, and construction of an environmental education/visitor center at Cache River NWR. The details of this alternative are summarized in Table 15.

FEATURES COMMON TO ALL ALTERNATIVES

Although the alternatives differ they have certain similarities among them as well. These common features are listed below to reduce the length and redundancy of the individual alternative descriptions.

Over the 15-year CCP implementation cycle, each alternative would aim to conserve and protect migratory birds and native fish and wildlife populations and the habitats on which they depend. Similarly, each alternative would continue to support endangered species recovery through research, surveys, and habitat conservation. All three alternatives would continue to encourage organized searches for Ivory-billed Woodpeckers at Cache River NWR, as well as appropriate protective measures and consultation when conducting management activities (Alternatives A and C only) or in the event of discovering an active nest or roost tree.

Under all alternatives, land acquisition from willing sellers would continue and would increase capacity to achieve refuge purposes. All alternatives would protect the functions and values associated with diverse bottomland hardwood forests, open wetlands, and aquatic systems in order to achieve the purposes of the refuges.

All three alternatives would promote communication, cooperation, and partnerships between local, state, and federal agencies, land managers, and private citizens to minimize impacts from off-refuge development and other threats to the functions and values of the Complex's associated wetland ecosystems and watersheds. Each would determine if any contaminants exist on the refuges, what their impacts to the various refuges are, and how to mitigate these impacts. Each alternative would continue to administer the Big Lake Wilderness at Big Lake NWR as part of the National Wilderness Preservation System.

Each alternative would aim to offer compatible hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation programs that lead to enjoyable experiences and a greater understanding of fish, wildlife, and habitat conservation by the public. With regard to hunting and fishing, each alternative would strive to provide for quality opportunities on all four refuges, if determined compatible with the purposes for which the refuges were established. Finally, none of the alternatives would consider camping, which has not been determined to be an appropriate activity in light of the refuges' purposes, Refuge System mission, administrative constraints, and public use needs.

COMPARISON OF THE ALTERNATIVES BY ISSUE

Table 15. Comparison of alternatives by management issue for the Central Arkansas National Wildlife Refuge Complex

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Fish and Wildlife Population Management			
Migratory Waterfowl	Maintain existing migratory waterfowl numbers and habitat acreage, which sometimes exceed and sometimes fall short of the NAWMP and LMVJV habitat and population goals.	Eliminate active management and habitat manipulation, while allowing open water, wetland, and forest habitats beneficial to waterfowl to develop or progress through habitat succession without intervention.	With the aid of additional biological and maintenance staff, expand and intensify habitat management activities sufficient to sustain and increase waterfowl use and meet the habitat and population goals of the NAWMP as stepped down through the LMVJV. Monitor results of management actions and adjust actions accordingly (adaptive management).
Wood Ducks (Big Lake/Wapanocca NWRs)	Maintain existing Wood Duck boxes and nest/brood habitats in bottomland hardwoods, cypress swamps, and scrub-shrubs, and help meet banding quotas to aid in monitoring of flyway populations.	Abandon use of Wood Duck boxes and depend on natural nesting cavities in cypress swamps and bottomland hardwoods, which are particularly valuable habitats for nesting and brood-rearing Wood Ducks.	Improve Wood Duck nest/brood/winter habitats and decrease dependency on Wood Duck boxes and help meet banding quotas to aid in monitoring of flyway populations. Monitor response of Wood Ducks to management actions and adjust actions accordingly (adaptive management).

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
American Woodcock	No specific management for American Woodcock habitat.	Same as Alternative A.	Enhance American Woodcock habitat to contribute to the objectives of the *American Woodcock Management Plan.* Monitor results of management actions and adjust actions accordingly (adaptive management).
Forest Breeding Birds	Continue forest restoration on newly acquired parcels and active management of a diversity of existing forested tracts to provide sufficient habitat to support priority forest bird species in the MAV.	Eliminate active management of forest stands for benefit of forest breeding birds, cease forest restoration on newly acquired parcels, and allow natural succession to proceed on all abandoned croplands, moist-soil units, and scrub-shrub habitats for the incidental benefit of forest breeding bird species.	With the aid of additional biological and forestry specialists to assist with planning, implementing, and monitoring, improve, intensify, and expand forest management and restoration programs for enhanced benefit of priority forest bird species in the MAV. Monitor results of management actions and adjust actions accordingly (adaptive management).
Scrub-shrub or Early Successional Birds (Bald Knob/Cache River/Wapanocca NWRs)	Continue active management practices to maintain current scrub-shrub acreage for the benefit of priority scrub-shrub species in the MAV.	Cease active management of croplands, moist-soil units, newly acquired parcels, and scrub-shrub habitats and allow habitat succession to proceed without intervention for the incidental benefit of priority scrub-shrub bird species.	With the aid of expanded biological and forestry staff, provide suitable habitat through forest restoration, silvicultural treatments, and development and maintenance of early successional and scrub-shrub habitat for high priority bird species in the MAV. Monitor results of management actions and adjust actions accordingly (adaptive management).

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Grassland Birds (Bald Knob/Cache River/Wapanocca NWRs)	No specific management for grassland birds; provide suitable habitat incidentally and seasonally on rice fields, moist-soil units, and old fields.	No active grassland management; allow grassland and open areas to proceed with natural habitat succession.	Provide, where feasible, through moist-soil and old field management, suitable habitat for high-priority grassland birds in the MAV. On Wapanocca NWR, convert approximately 250 acres of underutilized cropland to grassland habitat. Monitor results of management actions and adjust actions accordingly (adaptive management).
Shorebirds	Continue active shorebird habitat management at Bald Knob NWR on about 150 acres managed for mudflats; provide incidental benefits for shorebirds through current management actions on the other refuges and conduct occasional surveys.	Cease active management of moist-soils, lakes, and other impoundments for shorebirds but conduct at least one annual fall shorebird count to increase knowledge of each species' relative abundance and migratory trends.	Through precise timing of impoundment and lake drawdowns, provide sufficient mudflat and shallow water habitats for fall (southbound) migration to contribute to the objectives set forth in the U.S. Shorebird Conservation Plan, Lower Mississippi Valley/West Gulf Coastal Plain Shorebird Management Plan, and by the LMVJV. Additional staff will enable refuges to implement improved actions and monitor results of management actions and adjust actions accordingly (adaptive management).

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Colonial Waterbirds/ Wading Birds	No specific management for wading birds, but continue to incidentally provide habitat for breeding and wintering colonial waterbirds through currently managed shallow water areas and forested wetlands.	Cease active management of impoundments, lakes, and moist-soil units, but conduct at least one annual survey to increase knowledge of each species' relative abundance and distribution.	With the aid of additional staff provide critical habitats for long-legged wading birds to contribute to objectives set forth in the North American Waterbird Conservation Plan. Monitor results of management actions and adjust actions accordingly (adaptive management).
Marshbirds	No specific management for marshbirds, but continue to provide significant habitat in shallow water areas and moist-soil units. Conduct periodic surveys.	Cease active management of shallow water areas and impoundments, but conduct at least one annual survey to increase knowledge of each species' relative abundance and distribution.	Provide for high-quality breeding marshbird habitat in conjunction with meeting waterfowl habitat requirements where possible. Monitor results of management actions and adjust actions accordingly (adaptive management).
White-tailed Deer	No specific management for white-tailed deer, but continue active management of forest habitat, early succession open land, and cropland that incidentally benefits deer, while maintaining a healthy deer herd with a balanced sex and age structure at a level consistent with long-term habitat capability. Collect and analyze deer harvest data, conduct periodic herd health checks, and provide quality recreational opportunities.	Cease all active habitat management, allow habitat succession in open fields and croplands to succeed toward forest, and allow existing forest to proceed toward maturation, but continue to aim for a healthy deer herd with a balanced sex and age structure at a level consistent with long-term forest habitat capability, and provide quality recreational opportunities.	Same as Alternative A, except adjust hunting practices if and when necessary.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Eastern Wild Turkeys	No specific management for turkeys, but continue active habitat management that incidentally results in enhanced conditions for turkeys and provides quality recreational opportunities.	Cease all active habitat management and allow natural reforestation, habitat succession, and forest maturation to occur without intervention that incidentally results in suitable habitats for turkeys and provides quality recreational opportunities.	Same as Alternative A, except monitor turkey population status with the aid of additional staff.
Furbearers	Maintain healthy, diverse, and viable populations of furbearers and control nuisance animals when necessary.	Allow furbearer populations to fluctuate without intervention and do not control nuisance animals.	Implement expanded programs for controlling nuisance animals and implement regulated furbearer trapping by the public when and where feasible, desirable, and compatible.
Small Game (Mammals)	No specific management for small mammals, but continue active habitat management that incidentally results in enhanced habitats (a mosaic of croplands, grasslands, scrub-shrub, reforested sites, and mature forests), and provide quality recreational opportunities.	Cease active habitat management and allow natural reforestation and habitat succession to occur for the incidental benefit of small game mammals.	No specific management for small mammals, but with the aid of additional staff implement additional management programs in forest, moist-soil, scrub-shrub, and grassland habitats that incidentally enhance habitats for small game and other small mammals, and provide quality recreational opportunities.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Black Bears (Cache River NWR)	Maintain, restore, and enhance a variety of habitats suitable for use by black bears.	Cease all active habitat management and allow natural succession to begin to convert open areas to early successional habitats, and allow existing forested habitats to continue to mature, which would incidentally support black bears.	With the aid of additional staff, intensify restoration and management programs in a variety of habitats to provide conditions that would support increased use by black bears. Monitor bear occurrence and numbers. Monitor results of management actions and adjust accordingly (adaptive management).
Bats	Maintain and enhance a variety of habitats that would incidentally support a healthy, diverse, and viable resident bat population.	Cease active habitat management and allow natural succession to form wooded and wetland habitats that would support sustainable populations of most bat species.	With the aid of additional staff, expand and intensify management actions on a variety of habitats that would incidentally provide enhanced habitat conditions for bats. Perform surveys to document occurrence and habitat use.
Reptiles and Amphibians	Maintain and enhance habitat for a diverse assemblage of reptile and amphibian species.	Cease all active habitat management and allow natural succession to form wooded and wetland habitats that would support a diverse assemblage of reptile and amphibian species.	Expanded wetland restoration programs and intensified management of other habitats will increase habitat diversity and quality for reptiles and amphibians. With aid of additional staff, perform surveys to document occurrence, habitat use, and response to management actions and implement adaptive management.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Fisheries, Mussels, and Aquatic Habitat Management	Maintain riverine, lake, and floodplain aquatic habitats for the benefit of aquatic species and provide quality fishing opportunities.	Same as Alternative A.	With the aid of additional biological staff, maintain, enhance, and restore riverine, lake, and floodplain aquatic habitats, monitor fish and mussel occurrence and abundance, and provide improved fishing opportunities. Monitor results of management actions and adjust actions accordingly (adaptive management).
Threatened and Endangered Species	Continue to support endangered species recovery through research, surveys, and habitat conservation.	Same as Alternative A.	With the aid of additional biological and maintenance staff, expand listed species survey, research, recovery, and habitat restoration programs. Monitor results of management actions and adjust actions accordingly (adaptive management).
Ivory-billed Woodpecker (IBWO) (Cache River NWR)	Continue to maintain, restore, and enhance habitat for IBWO, continue to encourage organized searches for IBWO, and ensure appropriate protective measures and consultation when conducting management activities or in the response to discovering an active nest or roost tree.	Cease active habitat management and allow habitat to undergo natural succession to provide suitable habitat for IBWO, encourage organized searches, and ensure appropriate protection measures in response to discovering an active nest or roost tree.	Same as Alternative A, except with aid of additional staff, forest restoration management, and monitoring programs would be expanded and enhanced.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Investigations, Inventorying and Monitoring	Continue to conduct regular, annual monitoring of waterfowl and sporadic inventorying and monitoring of other wildlife and habitats on the refuges.	In cooperation with partners, establish and implement an Inventorying and Monitoring Plan.	With the aid of additional resource specialists and partners, establish and implement an Inventorying and Monitoring Plan that includes expanded and refined inventorying, monitoring, and research programs. Monitor results of management actions and adjust actions accordingly (adaptive management).
Habitat Management			
Cropland Habitat (Bald Knob/Cache River/Wapanocca NWRs)	Maintain current level of cropland acreage and management and supplement or substitute this acreage as needed to meet current foraging objectives identified in the step-down plans of the NAWMP and as suggested by waterfowl use patterns.	Phase out all croplands and allow this artificially maintained habitat to undergo natural succession.	With the aid of additional staff, increase or decrease managed cropland acreage as necessary to satisfy wildlife nutritional requirements, and improve water management capability to flood croplands as necessary to meet DEDs as specified in step-down plans and NAWMP and to fulfill refuge purposes. Monitor results of management actions and adjust actions accordingly (adaptive management).

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Moist-Soil Habitat	Maintain the current level of moist-soil management to provide food, forage, and cover for waterfowl, shorebirds, and other waterbirds.	Cease maintaining moist-soil habitats and allow this artificially maintained habitat to undergo habitat succession.	With the aid of additional staff, increase the acreage and intensify management of moist-soil units to increase the amount and diversity of habitat and foraging opportunities for waterfowl (to fulfill refuge purposes and meet DEDs, as specified in NAWMP), shorebirds, and other waterbirds. Monitor vegetation and wildlife response to treatments and implement adaptive management.
Forest Management	Manage bottomland hardwood forests to provide a natural diversity of plant and animal species found in the Lower MAV to fulfill the purposes of the refuges by providing habitats that satisfy the biological needs of migratory birds and other native wildlife.	Cease active management of bottomland hardwood forests (no silvicultural treatments, reforestation, or intervention) to provide a natural diversity of plant and animal species found in the Lower MAV to fulfill the purposes of the refuges by providing habitats that satisfy the biological needs of native wildlife and migratory birds.	With the aid of additional staff, intensify bottomland hardwood forest management and restoration programs to provide a diversity of habitats that will satisfy the biological needs of priority migratory bird species and other native wildlife. Monitor the vegetation and wildlife responses to habitat treatments and implement adaptive management as warranted.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Water Management	Continue current water management practices with existing facilities, infrastructure, and limitations in the ability to move water where and when needed for cropland, moist-soil, lake, and other wetland management units.	Cease all active water management, such as operation of water control structures, moist-soil units, and other impounded areas.	Restore, enhance, and maintain hydrologic regime of the refuges through intensified programs and additional and improved infrastructure that will increase water management and delivery capabilities in cropland, moist-soil, lake, and other wetland management units that provide important resources for wetland-dependent species. Monitor results of water management programs and implement adaptive management.
Resource Protection			
Wapanocca Lake Water Management (Wapanocca NWR)	Continue opportunistic efforts to maintain water depth, volume, area, and quality in Wapanocca Lake.	Cease all water management on Wapanocca Lake and allow natural processes, such as sedimentation and eutrophication, to proceed unmitigated; focus efforts on monitoring and reducing contamination in conjunction with partners.	Coordinate with partners to re-establish a dependable water source and improve the water management capability for Wapanocca Lake to ensure the long-term environmental health and associated benefits for waterfowl, shorebirds, aquatic species, and other native wildlife of Wapanocca NWR.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Water Management and Sedimentation (Big Lake NWR)	Continue to cooperate with the COE to manage water flows under the existing MOU, yet constrained by the resultant inability to control siltation loads during large flood events.	Abandon efforts to reduce sedimentation in Big Lake and allow lake to continue to fill in and establish different kinds of wetland and bottomland forest habitats.	Pursue modifications of MOU and standard orders with COE regarding water management actions and guidelines related to operation of structures and water levels in Ditch 81 to allow greater flexibility in the timing of water intake and water levels and improve water management capabilities to best meet refuge habitat needs and fulfill refuge purposes.
Invasive Plant and Animal Control	Opportunistically identify and control invasive or exotic plant and animal pests.	Identify and systematically track occurrence and encroachment by invasive or exotic plant and animal pests but cease control efforts.	Intensify and expand prevention and control programs for invasive or exotic plant and animal pests, including development of a database to track occurrences and control measures, and allowing regulated trapping of furbearers by the public (if determined to be compatible and desirable). Monitor results of control programs and adjust management actions accordingly.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Water Quality	Continue limited efforts on- and off-refuge to improve water quality and reduce levels of stream impairment from altered hydrology, turbidity, siltation, and pollution.	Allow habitat succession to proceed that may reduce erosion and sediment import, but cease preventive measures or other management actions to reduce stream perturbations or restore quality aquatic habitats.	With the guidance of a staff hydrologist, establish and implement management actions to protect and improve water quality of all aquatic resources on the refuges and the fish, mussel, and other wildlife resources that they support. Coordinate with partners and adjacent landowners to promote practices on adjacent lands that improve quality of the waters entering the refuges.
Contaminants	Document any contaminants that exist on the refuges, assess their impacts, and determine how to mitigate these impacts.	Monitor contaminant levels as feasible with reduced staff levels, but do not implement corrective actions.	Same as Alternative A, except implement mitigation measures if feasible.
Land Acquisition	Acquire land from willing sellers within existing acquisition boundaries.	Same as Alternative A.	Working with partners and an on-site staff realty specialist, acquire priority lands within or adjacent to the acquisition boundary from willing sellers that would enhance the conservation values of the refuges; pursue boundary expansions if necessary.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Outreach to Private Lands in Watershed	Continue to conduct occasional and opportunistic outreach to private landowners in the watershed to encourage beneficial conservation actions and stewardship.	Same as Alternative A.	Working with partners, reach out to basin/watershed landowners on a systematic basis to encourage conservation, management, and restoration actions that are beneficial to wildlife, aquatic species, and improved water quality.
Big Lake Wilderness (Big Lake NWR)	Continue to manage the Big Lake Wilderness as part of the National Wilderness Preservation System.	Same as Alternative A.	Same as Alternative A, except monitor effects of management actions and implement adaptive management as feasible.
External Threats	Promote communication, cooperation, and partnerships between other agencies, land managers, and private citizens to minimize impacts from development and external threats to the functions and values of the refuges' wetland ecosystems.	Same as Alternative A.	Expand and intensify efforts to promote communication, cooperation, and partnerships between other agencies, land managers, and private citizens to minimize impacts from off-site development and external threats to the functions and values of the refuges' wetland ecosystems.
Cultural Resources	Continue to implement Section 106 of the National Historic Preservation Act.	Same as Alternative A.	Develop and implement a Cultural Resources Management Plan with the aid of additional staff, including law enforcement officers.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Visitor Services			
Visitor Services Plan and Public Use Management	Continue to promote and manage public uses without the guidance of any visitor services staff or a Visitor Services Plan; conduct maintenance of roads, boat ramps, and infrastructure.	Same as Alternative A, except discontinue maintenance of roads, boat ramps, and other infrastructure that provide visitor access to conduct priority public uses.	Promote, manage, and improve appropriate and compatible public uses with the recruitment of visitor services staff and additional law enforcement staff, prepare and implement a Visitor Services Plan, and replace existing offices at Bald Knob, Big Lake, and Wapanocca NWRs with headquarters/visitor contact stations; construct an environmental education/visitor center at Cache River NWR.
Hunting	Continue to provide existing hunting opportunities that allow for quality public recreation and are compatible with the purposes for which the refuges were established.	Same as Alternative A, except discontinue maintenance of facilities and infrastructure that support hunting.	Recruit Visitor Services staff to improve and expand hunting opportunities, while ensuring safe, compatible, and quality experiences; monitor impacts of public use and adjust programs as needed.
Fishing	Continue to provide existing fishing opportunities that allow for quality public recreation and are compatible with the purposes for which the refuges were established.	Same as Alternative A, except discontinue maintenance of facilities and infrastructure that support fishing.	Recruit Visitor Services staff to improve and expand fishing opportunities, while ensuring safe, compatible, and quality experiences; monitor impacts of public use and adjust programs as needed.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Wildlife Observation and Photography	Continue to provide existing wildlife observation and photography opportunities that allow for quality public recreation and are compatible with the purposes for which the refuges were established.	Same as Alternative A, except discontinue maintenance of facilities and infrastructure that support wildlife observation and photography.	Recruit Visitor Services staff to improve and expand wildlife observation and photography opportunities, while ensuring safe, compatible, and quality experiences; monitor impacts of public use and adjust programs as needed.
Environmental Education and Outreach	Continue to provide existing environmental education and outreach opportunities that allow for quality public recreation and are compatible with the purposes for which the refuges were established.	Same as Alternative A, except discontinue maintenance of facilities and infrastructure that support environmental education and outreach.	Recruit Visitor Services staff to improve and expand environmental education and outreach opportunities, while ensuring safe, compatible, and quality experiences; construct new headquarters/visitor contact stations at Bald Knob, Big Lake, and Wapanocca NWRs and construct an environmental education/visitor center at Cache River NWR; monitor impacts of public use and adjust programs as needed.
Interpretation	Continue to provide existing interpretive opportunities that allow for quality public recreation and are compatible with the purposes for which the refuges were established.	Same as Alternative A, except discontinue maintenance of facilities and infrastructure that support interpretation.	Recruit Visitor Services staff to improve and expand interpretation opportunities, while ensuring safe, compatible, and quality experiences; monitor impacts of public use and adjust programs as needed.
Camping	No camping would be permitted.	Same as Alternative A.	Same as Alternative A.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Access	Existing access routes and facilities would be maintained.	Existing access routes and facilities would not be maintained.	With the aid of additional staff, access and facilities would be expanded and improved as necessary to accommodate expanded opportunities for public use.
Refuge Administration			
Staffing	Maintain existing staff at all refuges in the Complex.	Staff resources would be reduced as habitat and public use programs diminish due to minimal management.	Strategically expand staff according to program needs to increase capacity and capability to achieve refuge purposes and serve the public, including hiring law eforcement officers, Visitor Services manager/specialists, resource planner and specialists, and administrative and maintenance staff.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Volunteers and Partners	Continue existing volunteer programs and partnerships.	Same as Alternative A, but efforts directed toward recruiting, training, and managing volunteers and establishing and maintaining partnerships may be diminished with reduced staff resources; however, because of reduced staff, the need for volunteers and partners would increase.	With the aid of additional staff, expand the volunteer program, establish a Friends Group for each of the refuges, and expand cooperative efforts with partners.
Facilities, Infrastructure, and Equipment	Acquire and maintain all of the equipment and infrastructure necessary to perform habitat management, restoration, and improvement on the refuges, in addition to maintaining and improving essential infrastructure, such as roads, levees, and water control structures.	Eliminate equipment related to habitat management and only retain equipment and tools needed to perform minimal necessary activity as required by laws, regulations, or policies (e.g., human health and safety, endangered species protection, resource protection, law enforcement).	Same as Alternative A, except with the aid of additional maintenance staff and equipment, improved facilities and infrastructure that facilitate management programs for trust species, access for management purposes and visitor use, and facilitate visitor services. Replace existing offices at Bald Knob, Big Lake, and Wapanocca NWRs with headquarters/visitor contact stations, and construct an environmental education/visitor center at Cache River NWR (all buildings would incorporate green design features to reduce environmental impacts).

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 environmental assessment. For each alternative, the expected outcomes are portrayed through the 15-year implementation cycle of the Comprehensive Conservation Plan.

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 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 requires all its land management agencies 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 types—grasslands, forests, wetlands, tundra, perpetual ice, and desert—are effective both in preventing carbon emissions and in acting as biological "scrubbers" of atmospheric carbon dioxide. The conclusions of the Department of Energy's report noted that ecosystem protection is important to carbon sequestration and may reduce or prevent the loss of carbon currently stored in the terrestrial biosphere.

Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in this Draft CCP 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.

OTHER MANAGEMENT

All management activities that could affect the refuges' 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 refuges would be managed identically under each of the alternatives. Thus, the impacts would be the same.

LAND ACQUISITION

Funding for land acquisition from willing sellers within or adjacent to the approved acquisition boundaries of the four refuges within the Central Arkansas NWR Complex would come from the Land and Water Conservation Fund, the Migratory Bird Conservation Fund, Corps of Engineers mitigation programs, North American Wetlands Conservation Act, or donations from conservation and private organizations. Conservation easements and leases can be used to obtain the minimum interests necessary to satisfy refuge objectives, if the refuge staff can adequately manage uses of the areas for the benefit of wildlife. The Service can negotiate management agreements with local, state, and federal agencies, and accept conservation easements. Some tracts within the refuges' acquisition boundaries may be owned by other public or private conservation organizations. The Service would work with interested organizations to identify additional areas needing protection and provide technical assistance if needed. The acquisition of private lands is entirely contingent on the landowners and their willingness to participate.

CULTURAL RESOURCES

All alternatives afford additional land protection and low levels of development, thereby producing minimal negative effects on the refuges' cultural and historic resources. Potential negative effects could result from logging, construction of new trails, facilities, other infrastructure, and development of water impoundments. In most cases, these management actions would require review by the Service's Regional Archaeologist in consultation with the Arkansas State 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 that 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 by the Service, within or adjacent to the current acquisition boundary, 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 preservation, interpretation, and research.

REFUGE REVENUE-SHARING

Annual refuge revenue-sharing payments to Crittendon, Jackson, Mississippi, Monroe, Prairie, White, and Woodruff Counties would continue at similar rates under each alternative. If lands are acquired and added to the refuges, the payments would increase accordingly.

OTHER EFFECTS

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

SUMMARY OF EFFECTS BY ALTERNATIVE

The following section describes the environmental consequences of adopting each refuge management alternative. Table 16 summarizes and addresses the likely outcomes for specific issues and is organized by broad issue categories.

ALTERNATIVE A – CURRENT MANAGEMENT (NO ACTION)

Under Alternative A, no dramatic changes are anticipated in bird populations found on or frequenting the Complex's refuges. Migratory waterfowl numbers on the Complex would unlikely increase or decrease significantly as a result of implementation of this Alternative. Significant changes in Wood Duck population and production would also be unlikely. The presence of American Woodcock on the refuges is likely to remain minimal because of a paucity of habitat. Forest breeding bird populations would likely increase somewhat on the refuges as a result of reforestation, forest maturation, and limited forest management and silvicultural treatments, especially at Cache River NWR. However, scrub-shrub (early successional) bird numbers are likely to remain unchanged over the 15-year period, because of no change in the amount of available habitat. Low numbers of grassland birds are likely to continue to be found on marginal habitats scattered throughout the refuges. Southbound shorebird numbers likely would remain the same around the margins of wetlands and moist-soil units. Numbers of breeding and wintering colonial waterbirds would likely remain unchanged. Marshbird populations in shallow water areas and moist-soil units would also likely not experience any major change.

With regard to mammals, game species, furbearers, and other wildlife, the result of implementing Alternative A would be similar to the effects on birds – little to no expected change in abundance and distribution. The refuges' deer herds are likely to fluctuate in size from year-to-year but not follow any long-term trend. Population of wild turkeys would likely remain about the same. Populations of various furbearer and small game mammal species would also unlikely change overall. However, the black bear population may increase slowly over time, due to a gradual increase in their preferred forest habitat. Resident bat populations are expected to remain viable, although unpredictable variables like diseases could conceivably have pronounced effects on numbers and survival. The Complex's diverse assemblage of resident reptile and amphibian species is likely to continue. Aquatic habitats and fisheries would continue largely unchanged.

Threatened and endangered species on the Complex would continue to be protected under the Endangered Species Act. The most prominent endangered species that may occur on the Complex is the IBWO. Preferred habitat for IBWO, especially at Cache River NWR, would continue to improve.

Ongoing IBWO research and investigations would add to our knowledge of the presence of this species. Overall, benefits to IBWO would accrue due to investigative and management efforts on its behalf.

With regard to habitat, under Alternative A, no substantial deviations from the current status and trends are anticipated. The quality and quantity of cropland would continue relatively unchanged. Bottomland hardwood forests on the refuges would continue to provide a natural diversity of plant and animal species found in the LMV, and to fulfill the purposes of the refuges by sustaining the biological needs of migratory birds and native wildlife. With regard to water management at Bald Knob and Cache River NWRs, current limitations would continue to restrict water management and inhibit movement of water for the benefit of wildlife and aquatic and wetland habitats. Wapanocca Lake would continue to suffer gradual impairment and degradation. Big Lake would continue to experience siltation, with a consequent loss of open water and decreasing depth, further impairing the lake's habitat and recreational value.

Across the Complex as a whole, a variety of invasive plant and animal species would continue to gradually encroach into native communities of flora and fauna on the refuges; current control efforts are only partially successful in precluding the spread of invasives and this would continue to be the case. At Bald Knob and Cache River NWRs, a modest reduction in current levels of stream impairment from turbidity and siltation is possible due to increasing reforestation and implementation of soil conservation measures on and off the refuges. With regard to contaminants on the Complex, greater knowledge on their extent and distribution, both from investigations by the Service and other agencies, would provide a more solid basis for their control, but the extent to which this would actually occur is uncertain due to political, economic, and technical constraints.

Under Alternative A, each refuge would continue to acquire lands from willing sellers, but within unchanging acquisition boundaries. Outreach to private landowners in the watershed could result in additional conservation actions that benefit wildlife and the refuges. At Big Lake NWR, the Big Lake Wilderness would continue to be protected from development but would still be compromised by such intrusions as noise and litter. At Cache River NWR, external developments beyond the refuge's boundaries would continue to have long-term and widespread, relatively adverse impacts on its resources, which would likely be only partially mitigated by any efforts the refuge might undertake. However, cultural resources would continue to be protected under Section 106 of the National Historic Preservation Act across the entire Complex.

With respect to public use, overall visitor services on the Complex would likely prove insufficient to handle an expected increase in the number of visitors; thus, the quality of the visitor experience may well diminish. Nevertheless, hunting and fishing opportunities throughout the Complex would probably remain the same over time. Likewise, existing opportunities for wildlife observation and photography on the Complex would not change. Furthermore, existing environmental education and interpretive efforts on the Complex would continue unchanged. No camping would be permitted on the Complex, because of concerns about its appropriateness and compatibility with refuge purposes and a shortage of staff and law enforcement necessary to manage camping. Existing access routes and facilities on the refuges would be maintained under Alternative A.

Climate change is an issue affecting all national wildlife refuges. On the Complex, few changes in the climate are likely to be observable over the coming 15 years. Average temperatures may rise, with hotter summers and warmer winters, especially winter nights. There could also well be changes in total precipitation and distribution. However, the ecological implications of such subtle changes to climate over a relatively short period are not predictable at present.

Litter and trash left by anglers, hunters, and other visitors would continue to be a problem at a number of sites under Alternative A. The Complex would continue to have inadequate law enforcement, and as a result, problems like trespassing, poaching, and other violations would not abate.

ALTERNATIVE B – MINIMAL MANAGEMENT

In many respects, Alternative B would result in sharply different outcomes than those of Alternative A, the no-action alternative, or Alternative C, the proposed alternative. With regard to migratory waterfowl, related directly to the purposes for which the refuges were established, numbers of wintering migratory birds on the Complex would likely decline substantially with the elimination of croplands and moist-soil units. With the eventual loss of artificial nest boxes on Big Lake and Wapanocca NWRs, which would not be maintained or replaced as they age, Wood Duck numbers and production would likely experience at least a moderate decrease.

American Woodcock may experience a slight increase in use of the refuges due to natural succession in abandoned croplands and moist-soil units. However, the presence of American Woodcock would still probably remain minimal. There are few now, and under both Alternatives A and B, there likely would continue to be few in the future.

Over the 15-year planning horizon, forest breeding bird populations would likely remain the same or decrease on the refuges, more than under Alternative A, because of less afforestation, no silvicultural treatments to enhance habitat, and tree death due to beaver impoundments. As natural reforestation of open sites and habitats occurs, scrub-shrub associated bird species would probably experience a temporary increase in numbers because of increased transitional, early successional habitat. However, grassland birds would likely diminish further or disappear altogether from the refuges – due to disappearance of their habitat, or its conversion first to scrub-shrub and later to forest. Shorebird numbers would also decrease due to loss of suitable habitat (mostly moist-soil areas) and lack of water management. Likewise, numbers of breeding and wintering colonial waterbirds would likely decrease.

Under Alternative B, there would be no active habitat management for marshbirds on the Complex, but staff would conduct at least one annual survey at each refuge to increase knowledge of each species' relative abundance and distribution. Marshbird numbers could remain stable or decrease somewhat, depending on the degree of woody plant encroachment in marsh habitat.

Loss of cropland (reversion to forest) would reduce energy-rich food resources for white-tailed deer, but the increase in browse (shoots and leaves) from more early successional vegetation (scrub-shrub) would somewhat offset this loss of crop acreage. The net outcome is uncertain over the coming 15-year period. Over the longer term, the deer herd would decline as the forests continue to mature and understory vegetation diminishes.

The wild turkey population on the Complex would likely decrease slightly over the 15-year span of the CCP because of less afforestation, less silvicultural enhancement, and increased inundation of forests by beavers. With regard to furbearers, certain species would likely increase, particularly beaver, while certain others may decrease due to expected habitat changes. The relative abundance of small game mammal species is expected to shift to species that prefer scrub-shrub and forested habitats. The black bear population likely would remain unchanged during the 15-year time span under this alternative.

The relative abundance of bats is anticipated to shift to species that prefer less open and forested habitats. Among reptiles and amphibians, overall species diversity is likely to decrease, but the populations of species favoring forest would likely increase.

Under Alternative B, as under Alternative A, threatened and endangered species on the Complex would continue to be protected under the Endangered Species Act. The most prominent endangered species that may occur on the Complex is the IBWO. Preferred habitat for IBWO, especially at Cache River NWR, would continue to expand with forest maturation, even in the absence of treatments. Ongoing IBWO research and investigations would add to our knowledge of this species. Overall, knowledge of IBWO would accrue due to investigative efforts on its behalf, but management capacity would be diminished due to reduced staff resources.

With regard to habitat management, under Alternative B essentially all active habitat management and manipulation would cease. Cropland foods and their contributions to waterfowl and other wildlife would be eliminated, as cultivated areas are allowed to revert to scrub-shrub and then forest habitats through ecological succession. Similarly, moist-soil habitat and its contributions to waterfowl, shorebirds, other waterbirds, and grassland birds would be eliminated; as these areas would revert either to unmanaged wetlands or to bottomland hardwood forest.

While the area and maturity of forests would increase over time, without management and treatment, the refuges' forests would become less attractive to many species as the canopies grew increasingly closed and vertical structure declined (i.e., they increasingly lacked complex forest structure due to diminished midstories and understories). Furthermore, unchecked beaver activity would result in general decline in forest habitat suitability for numerous species.

With the cessation of all active water management, water-dependent habitats and wildlife would decrease. The condition of Wapanocca Lake would likely worsen appreciably without any active management intervention. Likewise, Big Lake would silt in even more rapidly than at present, and after 15 years could be expected to contain much less open water surface area and total water volume. Aquatic habitats and fisheries on Bald Knob and Cache River NWRs would continue largely unchanged under minimal management.

With regard to resource protection issues facing the Complex, Alternative B is more similar to Alternative A. One exception concerns invasives and nuisance animals – more would be learned about the penetration of and impacts of invasive plants and animals on the refuges, (but to the detriment of priority species) because they would continue to encroach on native communities at an accelerated rate because there would not be active efforts undertaken to prevent their spread under minimal management. Forest habitat quality would decline in the 15-year time frame of the CCP because unchecked beaver populations would result in greatly increased numbers of semi-permanent impoundments that would promote tree mortality. This decline and mortality would have negative impacts on forest-dwelling birds and other wildlife. Waterfowl habitat quality would decline due to decreased food and cover as timber death advanced.

At Bald Knob and Cache River NWRs, a modest reduction in current levels of stream impairment from turbidity and siltation is possible due to increasing reforestation and implementation of soil conservation measures off the refuges. With regard to contaminants on the Complex, greater knowledge on their extent and distribution, both from investigations by the Service and other agencies, would provide a more solid basis for their control, but the extent to which this would actually occur is uncertain due to political, economic, and technical constraints.

Under Alternative B, land acquisition would continue, but within unchanging acquisition boundaries. Outreach to private landowners in the watershed could result in additional conservation actions that benefit wildlife and the refuges. At Big Lake NWR, the Wilderness would continue to be protected from development but would still be compromised by such intrusions as noise, litter, and the impacts of sedimentation. At Cache River NWR, external developments beyond the refuge's boundaries

would continue to have long-term and widespread, relatively adverse impacts to its resources, which would likely be only partially mitigated by any efforts the refuge might undertake. However, cultural resources would continue to be protected under Section 106 of the National Historic Preservation Act across the entire Complex.

Under Alternative B, although the same facilities and visitor services would be provided as in Alternative A, they would not be maintained or improved, and the overall quality of visitor experience would likely decrease more sharply than in Alternative A because of diminished opportunities and access for visitors engaging in priority public uses. In general, most wildlife is not expected to be as abundant or viewable under this alternative. Hunting opportunities would be similar to Alternative A for awhile, but within the 15-year planning time frame, would gradually begin to diminish with disappearance of habitat diversity on the refuges. However, fishing opportunities throughout Complex likely would remain relatively unchanged over the 15-year span of this CCP. Wildlife observation and photography opportunities would likely decrease, because of habitat conversions and reduced abundance and diversity of viewable wildlife. Environmental education and interpretive opportunities would not be developed or expanded.

As in all alternatives, no camping would be permitted on the Complex because of concerns about its appropriateness and compatibility with refuge purposes and a shortage of staff and law enforcement necessary to manage camping. Facilities benefiting visitors, such as maintained roads, boat ramps, kiosks, and other structures would decline in function and would negatively impact visitor access and quality of experience on all refuges.

Climate change is an issue affecting all national wildlife refuges. On the Complex, few changes in the climate are likely to be observable over the coming 15 years. Average temperatures may rise, with hotter summers and warmer winters, especially winter nights. There could also well be changes in total precipitation and distribution. However, the ecological implications of such subtle changes to climate over a relatively short period are not predictable at present.

Litter and trash left by anglers, hunters, and other visitors would likely be reduced at problem sites under Alternative B, due to decreased visitations resulting from diminished opportunities. Additional problems such as dumping, vandalism, and other illegal activities could increase as the public perceives the Service does not value the refuge because of inadequate attention to maintenance and reduced law enforcement.

ALTERNATIVE C – ENHANCED HABITAT AND PUBLIC USE MANAGEMENT (PROPOSED ALTERNATIVE)

Overall, during the 15-year time frame of this CCP, Alternative C would have more beneficial effects in terms of fulfilling refuge purposes than either Alterative A or Alternative B. With implementation of the measures proposed, migratory waterfowl, Wood Duck, and American Woodcock numbers are all likely to increase somewhat over current levels. Forest breeding bird populations are also likely to benefit on the refuges more from Alternative C than B, because of increasing amounts of enhanced forest habitat, forestry treatments aimed specifically at improving habitat quality for priority bird species, and control of beaver impoundments. The numbers of early successional birds would increase because of conversion to and maintenance of such habitat, but probably not significantly greater than from Alternatives A or B during the 15-year span of the CCP. High-priority grassland birds for the MAV are likely to increase somewhat in moist-soil areas and areas managed as grasslands, as are southbound shorebird numbers. Numbers of breeding and wintering colonial waterbirds and marshbirds may possibly increase over Alternative A due to enhanced marsh management and implementation of adaptive management practices.

With regard to mammals, game species, furbearers, and other wildlife, the result of implementing Alternative C would be similar to that of Alternative A (but more positive than Alternative B) – little to no expected change in abundance and distribution over the 15-year span of this CCP. The refuges' deer herds are likely to fluctuate in size from year-to-year, but not follow any long-term trend. The population of wild turkeys would likely remain about the same or increase slightly due to more intensive forest management practices. Populations of different furbearers and small game mammal species would also unlikely change overall. However, the black bear population may increase slowly over time, due to a gradual increase in quantity and quality of their preferred forest habitat. Resident bat populations are expected to remain viable, although unpredictable variables like diseases could conceivably have pronounced effects on numbers and survival. The Complex's diverse assemblage of resident reptile and amphibian species is likely to continue. Aquatic habitats and fisheries would continue largely unchanged, and information useful for improved management would be augmented.

Threatened and endangered species on the Complex would continue to be protected under the Endangered Species Act. The most prominent endangered species that may occur on the Complex is the IBWO. Preferred habitat for IBWO, especially at Cache River NWR, would continue to improve. Ongoing IBWO research and investigations would add to our knowledge of this species. Overall, benefits to IBWO would accrue due to investigative and management efforts on its behalf.

Under Alternative C, the quality and quantity of cropland habitat would be improved due to fine-tuning the programs to enhance use by waterfowl and other migratory birds. Improvements in moist-soil management would increase the amount of food, cover, and forage provided to waterfowl, shorebirds, and other waterbirds. Enhanced bottomland hardwood forest habitats (via silvicultural treatments) on the refuges would continue to provide a natural diversity of plant and animal species found in the LMV, and to fulfill the mission and purposes of the refuges by sustaining the biological needs of native wildlife and migratory birds. Improved water management at Bald Knob and Cache River NWRs would benefit wetland-dependent species. The worsening condition of Wapanocca Lake may be halted, or in best case scenario, improved for the benefit of waterfowl and other migratory birds. Similarly, the siltation of Big Lake could be arrested or at least slowed, increasing habitat quality and extending its useful life.

With regard to invasives, development of a database would help the Complex to systematically track occurrences and treatments of encroaching species of invasive plants and animals. The continuing advance of invasives may be slowed, halted, or reversed. Beaver control would be exercised to minimize deleterious impacts to refuge habitats, infrastructure, and other facilities.

Water quality impairment at Bald Knob and Cache River NWRs from turbidity and siltation may be reduced more than in Alternatives A and B, with full implementation of the measures and strategies proposed under Alternative C.

Under Alternative C, some additional lands adjacent to the refuges would likely be protected due to potential minor refuge boundary expansions and increased land purchases from willing sellers. Preparation and implementation of a Cultural Resources Management Plan (CRMP) would improve both knowledge and preservation of the Complex's cultural resources.

With the implementation of Alternative C, the capacity and capability of the refuges to better manage the habitat and wildlife resources of all refuges would greatly increase compared to Alternatives A or B. Additional biological/resource specialists (under Alternative C, compared to Alternatives A or B) would improve the refuges' ability to inventory, monitor, and adjust management actions according to analysis of responses to various management techniques. Additional maintenance staff will enable additional improvements to infrastructure, such as impoundments and water control structures. With

regard to public use under Alternative C, the overall visitor experience would be improved due to increased facilities, recreational and educational opportunities, and dedicated visitor services staffing. Hunting opportunities throughout the Complex may improve somewhat from increased visitor services, but also from improved habitat and more abundant game. Fishing opportunities throughout the Complex would generally remain the same over the 15-year span of this CCP. Both facilities and opportunities for wildlife observation, wildlife photography, and environmental education and interpretation would be expanded and improved.

Obtaining additional staff, such as law enforcement officers and visitor services specialists, would enhance all visitor services including environmental education and interpretive opportunities on the Complex. The capacity and capability of the Complex to effectively administer and provide comprehensive public use programs would be increased with the replacement of existing office buildings and construction of new headquarters/visitor contact stations at Bald Knob, Big Lake, and Wapanocca NWRs, and construction of an environmental education/visitor center at Cache River NWR. However, camping would continue to be prohibited because of concerns about its appropriateness and compatibility with refuge purposes, and a shortage of staff and law enforcement necessary to manage camping. Access, nonetheless, would be improved to accommodate increased and more diversified public uses.

Climate change will affect all national wildlife refuges in the future. On the Complex, few changes in the climate are likely to be observable over the coming 15 years. Average temperatures may rise, with hotter summers and warmer winters, especially winter nights. There could also well be changes in total precipitation and distribution. However, the ecological implications of such subtle changes to climate over a relatively short period are not predictable at present.

Litter and trash left by anglers, hunters, and other visitors would likely be reduced at problem sites under Alternative C, due to a greater presence of law enforcement officers. Similarly, adding two law enforcement officers to the Complex would represent a beneficial impact by minimizing problems like trespassing, poaching, vandalism, and habitat degradation from practices like “mudding” (riding vehicles off-road and creating extensive, deep ruts in the soil). Additionally, these officers could provide critical outreach functions, help ensure protection of wildlife, habitat and cultural resources, and provide for visitor protection.

Table 16. Comparison of environmental effects of alternatives by management issue for the Central Arkansas National Wildlife Refuge Complex

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Fish and Wildlife Population Management			
Migratory Waterfowl	Migratory waterfowl numbers unlikely to increase or decrease significantly.	Migratory waterfowl numbers likely to decline sharply with elimination of croplands and moist-soil units, but would temporarily be offset somewhat by increased flooding of forested habitats due to unchecked beaver activity.	Migratory waterfowl numbers likely to increase moderately compared to Alternatives A or B due to enhanced habitat conditions.
Wood Ducks	Wood Duck population and production unlikely to change.	With eventual loss of artificial nest boxes on Big Lake and Wapanocca NWRs, Wood Duck numbers and production likely to experience a moderate decrease. Populations unlikely to change on Bald Knob and Cache River NWRs. Unchecked beaver flooding would create additional brood-rearing habitat and begin to create additional nest cavity formation due to increased tree mortality on all refuges.	Wood Duck numbers and production likely to increase somewhat compared to Alternatives A or B due to enhanced habitat conditions. Banding quotas likely to be more consistently met.
American Woodcock	Presence of American Woodcock likely to remain minimal.	Presence of woodcock likely to remain minimal with possible slight increase in abandoned croplands and moist-soil units.	Woodcock occurrence and use likely to increase moderately compared to Alternatives A or B due to enhanced habitat conditions.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Forest Breeding Birds	Forest breeding bird populations likely to increase moderately.	Possible slight decrease in forest breeding bird populations due to diminished forest habitat quality and diversity because of a reduction in forest habitat improvement treatments and unchecked beaver activity.	Forest breeding bird populations likely to increase more than under Alternatives A and B because of increasing amounts of suitable forest habitat resulting from expanded and improved forestry treatments, including afforestation and reforestation, that enhance habitat quality and diversity for priority forest bird species.
Scrub-shrub or Early Successional Birds	Scrub-shrub/early successional bird numbers likely to remain unchanged.	Scrub-shrub bird numbers would likely remain unchanged; bird species using habitat that would occur within 3 to 10 years following abandonment of croplands and moist-soil units would likely increase more than under Alternatives A or C, unless such habitats are inundated by beavers.	Numbers of early successional birds would increase because of habitat conversions and maintenance of such habitat compared to Alternative A, but probably not as much as under Alternative B. Numbers of scrub-shrub species would likely increase slightly only toward the end of the 15-year CCP cycle.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Grassland Birds	Numbers of grassland birds likely to remain low due to marginal habitats.	Grassland birds likely to increase during the 15-year CCP cycle compared to Alternatives A or C due to suitable habitat occurring in abandoned croplands and moist-soil units (where not inundated by beavers).	Numbers of high priority grassland birds for the MAV likely to increase moderately compared to Alternative A due to areas managed specifically for grassland habitats (particularly at Wapanocca NWR due to conversion of approximately 250 acres of under-utilized croplands to grasslands), but likely not as much as Alternative B during this 15-year CCP cycle due to abandonment of large acreages of croplands.
Shorebirds	Shorebird numbers likely to remain the same.	Shorebird numbers would decrease due to loss of suitable habitat.	Numbers likely to increase significantly compared to Alternatives A or B due to more intensive and extensive habitat management.
Colonial Waterbirds/ Wading Birds	Numbers of breeding and wintering colonial waterbirds would likely remain unchanged.	Numbers of breeding and wintering colonial waterbirds may exhibit slight decrease due to abandonment of moist-soil and water management programs. This decrease could be offset in acres flooded by unchecked beaver activity.	Numbers may increase slightly compared to Alternatives A or B due to enhanced moist-soil and water management programs.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Marshbirds	Marshbird populations in shallow water areas and moist-soil units unlikely to change.	Marshbird populations would likely decline due to habitat succession in unmanaged shallow water areas and moist-soil units and lack of water management.	Numbers may increase slightly compared to Alternatives A or B due to enhanced moist-soil and water management programs.
White-tailed Deer	Deer herd likely to benefit from habitat improvements but not follow any long-term trend.	Slight decreases possible due to loss of energy-rich cropland food resources and loss of suitable forest habitat in areas of beaver flooding; however, these declines could be offset by favorable early successional habitat in large acreages of abandoned croplands during this 15-year CCP cycle.	Deer herd likely to increase due to enhanced habitat conditions.
Eastern Wild Turkeys	Numbers of wild turkey would likely remain about the same.	Wild turkey numbers would likely decrease because of less afforestation and silvicultural enhancement, and increased inundation of habitat by beavers; possibly offset by habitat succession in abandoned croplands and moist-soil units.	Wild turkey numbers may increase slightly due to increased quality and quantity of forest habitat, but should generally remain the same compared to Alternative A.
Furbearers	Numbers of various furbearer species unlikely to exhibit significant changes overall.	Furbearer species (particularly beavers, nutria, and muskrat) would increase due to reduced control efforts and habitat succession in cropland and moist-soil units.	Furbearer species would likely be held in check compared to Alternatives A or B due to expanded and intensified control efforts.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Small Game (Mammals)	Numbers of small game mammal species expected to remain essentially unchanged.	Relative abundance of certain small game mammals would likely increase due to increase in early successional habitats in abandoned croplands and moist-soil units.	Same as Alternative A.
Black Bears (Cache River NWR)	Black bear use of refuge habitats may slightly increase due to a gradual increase of quantity and quality of their preferred forest habitat.	Black bear use of refuge habitats likely to remain unchanged, but may decline somewhat due to diminished habitat quality (e.g., increased permanently flooded habitat from unchecked beaver activity and decrease in diverse food sources).	Same as Alternative A.
Bats	Resident bat population expected to remain viable, although unpredictable variables like diseases can have pronounced effects.	Relative abundance of bats may shift towards those species that prefer early successional and undisturbed forested habitats.	Same as Alternative A, with possible slight increases due to habitat improvements.
Reptiles and Amphibians	Diverse assemblage of resident reptile and amphibian species likely to continue.	Relative abundance of reptile and amphibian species favoring early successional, undisturbed forest, and flooded (from unchecked beaver activity) habitats likely to increase compared to Alternatives A or C.	Same as Alternative A, with possible slight increases in species favored by expanded moist-soil and wetland management.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Fisheries, Mussels, and Aquatic Habitat Management	Aquatic conditions would continue largely unchanged.	Same as Alternative A, except sport fishing opportunities would be diminished.	Same as Alternative A, except if improvements are realized in water quality and management in Big Lake and Wapanocca Lake, increased numbers of fishes, mussels, and aquatic species could be expected. Monitoring of responses to actions would allow for adaptive management when improvements are needed.
Threatened and Endangered Species	Threatened and endangered species would continue to be protected.	Same as Alternative A, except capacity to deliver restoration and recovery programs would diminish with reduced staff.	Same as Alternative A, except additional monitoring and research would enable adaptive management when improvements are needed.
Ivory-billed Woodpecker (IBWO) (Cache River NWR)	Preferred habitat for IBWO would continue to improve. Ongoing investigations would increase understanding of IBWO ecology and management needs.	Same as Alternative A, except capacity to deliver restoration and recovery programs would diminish with reduced staff.	Forest habitat management would be enhanced and refined resulting in better conditions for IBWO compared to Alternatives A or B. Intensified monitoring would better enable adaptive management.
Investigations, Inventorying, and Monitoring	Information would be gained on an annual basis on waterfowl numbers and habitat use.	Information would be gained on species occurrence, numbers, trends, and habitat use, but the information will not be applied due to cessation of active management programs.	Improved information would be gained on wildlife occurrence, numbers, trends, habitat use, and response to management programs compared to Alternatives A or B. An adaptive management approach could be fully implemented.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Habitat Management			
Cropland Habitat (Bald Knob/Cache River/Wapanocca NWRs)	Quality and quantity of cropland habitat and associated waterfowl benefits would continue relatively unchanged.	Cropland and its associated contributions to waterfowl and other wildlife would be eliminated.	Quality and perhaps quantity of managed cropland would increase compared to Alternatives A or B due to the expanded and improved programs enabled by adaptive management to provide more DEDs (quantity of cropland habitat on Wapanocca NWR will be significantly reduced due to lack of use by Canada Geese).
Moist-Soil Habitat	Quality and quantity of moist-soil habitat and associated wildlife benefits would continue relatively unchanged.	Moist-soil habitat and its associated contributions to waterfowl, shorebirds, other waterbirds, grassland birds, and other native wildlife would be eliminated.	Improved and expanded moist-soil management programs would increase the amount of food provided to waterfowl, shorebirds, other waterbirds, and other native wildlife compared to Alternatives A or B. Adaptive management would be implemented.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Forest Management	Bottomland hardwood forests would continue to provide a natural diversity of plant and animal species found in the Lower MAV by sustaining the biological needs of migratory birds and other native wildlife.	Quantity of early successional forest would increase and existing forest would continue to mature without intervention compared to Alternatives A or C, but without treatment, forests would become less attractive to many species of wildlife as canopy closure progresses, complexity (midstory and understory structure) decreases, and widespread tree mortality results from unchecked beaver activity. Early successional forest habitats would become established on abandoned croplands, grasslands, and moist-soil units.	Overall forest habitat quality would be enhanced through intensified and expanded forest treatments compared to Alternatives A or B. Management programs would be improved through application of adaptive management.
Water Management	Current limitations continue to prevent water management programs from providing optimum habitats.	With cessation of all active water management, quality of water-dependent habitats and wildlife use would decrease.	Adding a staff hydrologist, improving water management programs, and implementing adaptive management would enhance conditions for aquatic and wetland-dependent species compared to Alternatives A or B.
Resource Protection			
Wapanocca Lake Water Management (Wapanocca NWR)	Wapanocca Lake would continue to suffer gradual impairment and degradation.	Condition of Wapanocca Lake would likely worsen appreciably without management intervention.	Worsening condition of Wapanocca Lake may be halted and perhaps improved compared to Alternatives A or B, along with associated benefits to waterfowl,

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
			shorebirds, and aquatic species. Adaptive management would be employed to improve restoration and management of the lake system.
Water Management and Sedimentation (Big Lake NWR)	Big Lake would continue to exhibit siltation, with resultant loss of open water and decreasing depth, further impairing the lake's habitat and recreational value.	Big Lake would exhibit even more rapid siltation, resulting in much less open water surface area, total water volume, and suitable wildlife and aquatic habitats.	Sediment import and resultant siltation of Big Lake may be arrested or at least delayed compared to Alternatives A or B, with associated improved habitat conditions for waterfowl, water birds, aquatic species, and other native wildlife. Adaptive management would be employed to enable recovery and restoration of aquatic habitats.
Invasive Plant and Animal Control	A variety of invasive plant and animal species continue to gradually encroach into native communities of flora and fauna; control efforts are only partially successful in precluding the spread of invasives.	More is learned about the occurrence, colonization, and spread of invasives, but without control, they continue to encroach on native communities, pose risks for priority species, and damage refuge habitats and facilities at an accelerated rate.	Identification of problem areas would be intensified and implementation of improved control measures would be increased. Intensified monitoring would include a database to help systematically track occurrences and treatments. The detrimental impacts of invasive plants and nuisance animals would be more effectively delayed, halted, or reversed, and habitat would be restored for the benefit of priority wildlife species and visitors compared to Alternatives A or B.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Water Quality	Modest reduction in levels of stream impairment from turbidity and siltation is possible.	Same as Alternative A, except unchecked beaver activity could reduce sedimentation in some areas, but stagnation in older impoundments would reduce water quality.	Water quality may be improved compared to Alternatives A or B due to the addition of a staff hydrologist and expanded water quality improvement programs on- and off-site.
Contaminants	Greater knowledge of the extent and distribution of contaminants is needed to provide a more solid basis for their control.	Same as Alternative A, except no control measures would be implemented.	In partnership with others, contaminant assessments would be performed and control measures implemented to improve environmental health, if feasible.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Land Acquisition	Land acquisition may increase the size of refuges (except Big Lake NWR) within unchanging acquisition boundaries.	Same as Alternative A, except staff resources needed to support acquisition and boundary maintenance may be diminished.	Priority land acquisition would continue from willing sellers within the acquisition boundaries and minor boundary expansions would be pursued, using a strategic landscape conservation approach that would result in protection, conservation, and restoration of lands to better enable fulfillment of refuge purposes compared to Alternatives A or B. Increased land acquisitions and boundary expansions would generally result in overall increases in habitat quantity and capacity (e.g., afforestation and hydrologic restoration) that would, in conjunction with enhanced habitat management programs, allow priority wildlife species to increase in greater numbers as compared to Alternatives A or B. Major boundary expansions could be evaluated and pursued within the 15-year span of this CCP if deemed necessary from a trust species and landscape conservation standpoint and if publicly acceptable.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Outreach to Private Lands in Watershed	Outreach to private landowners in the watershed could result in additional conservation actions that benefit wildlife and the refuges.	Same as Alternative A, except outreach with landowners may diminish with reduced staff resources.	With hiring of visitor services staff and a hydrologist, outreach efforts would be expanded to achieve greater conservation benefits on and off-site compared to Alternatives A or B.
Big Lake Wilderness (Big Lake NWR)	Big Lake Wilderness would continue to be protected from development but still would be compromised by such intrusions as noise, litter, and environmental degradation from sediment import.	Same as Alternative A, except capacity to effectively manage the Wilderness may be diminished due to decreased staff resources.	An improved MOU for water management with the COE would result in improved habitat quality compared to Alternatives A or B, and additional staff would enable better monitoring and adaptive management of the Wilderness.
External Threats	External threats would continue to have long-term and widespread, relatively adverse impacts on the refuges' resources, which would likely be only partially mitigated by the refuges' efforts.	Same as Alternative A, except contacts with partners, NGOs, and public may decrease due to reduced staff resources.	Same as Alternative A, except additional staff would enable expanded and intensified monitoring programs to detect, evaluate, and mitigate adverse impacts in conjunction with partners where and when feasible.
Cultural Resources	Protection of cultural resources would be continued under Section 106 of the National Historic Preservation Act.	Same as Alternative A, except capacity to implement may diminish with reduced staff resources.	Preparation and implementation of a CRMP would improve both knowledge and preservation of cultural resources, compared to Alternatives A or B.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Visitor Services			
Visitor Services and Public Use Management	Overall visitor services would likely prove insufficient to handle a projected demand by the public for increased visitor services and an increase in the number of visitors; the quality of the visitor experience may diminish.	Overall quality of the visitor experience would likely diminish more sharply than in Alternative A or C because of reduced opportunities and access for engaging in priority public uses, due to lack of maintenance of facilities and infrastructure.	Overall visitor experience would be enhanced and public use opportunities would be expanded compared to Alternatives A and B due to dedicated visitor services staffing, additional lands available for public use, increased access, improved facilities (including construction of new headquarters/visitor contact stations at Bald Knob, Big Lake, and Wapanocca NWRs and construction of an environmental education/visitor center at Cache River NWR).
Hunting	Hunting opportunities would generally remain the same over time.	Hunting opportunities would be similar to Alternative A, but would gradually begin to diminish somewhat with degradation of habitat diversity and quality and reduced access.	Hunting opportunities may improve somewhat compared to Alternatives A or B due to refuge expansions, increased visitor services, improved habitat, and more abundant game.
Fishing	Fishing opportunities would generally remain the same.	Fishing opportunities would be similar to Alternative A, but would gradually begin to diminish with degradation of habitat diversity and quality and reduced access.	Fishing opportunities may improve somewhat compared to Alternatives A or B due to increased emphasis and effort directed toward improving the quality of aquatic habitats, increased visitor services, and refuge expansions.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Wildlife Observation and Photography	Existing opportunities for wildlife observation and photography would generally remain the same.	Opportunities would likely decrease because of habitat conversions, reduced abundance and diversity of viewable wildlife, and reduced access.	Both facilities and opportunities for wildlife observation and photography would improve compared to Alternatives A or B due to more abundant wildlife and increased emphasis and effort directed toward visitor services, and refuge expansions.
Environmental Education and Outreach	Existing environmental education and outreach efforts and opportunities would generally remain the same.	Environmental education opportunities would decrease due to unimproved facilities, reduced access, and diminished habitat quality and wildlife use.	Both facilities and opportunities for environmental education and outreach would improve compared to Alternatives A and B due to increased emphasis and effort directed toward visitor services, recruitment of dedicated staff to develop and implement environmental education and outreach programs, and construction of new headquarters/visitor contact stations at Bald Knob, Big Lake, and Wapanocca NWRs and construction of an environmental education/visitor center at Cache River NWR.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Interpretation	Existing interpretive efforts and opportunities would continue unchanged.	Interpretive opportunities would decrease due to unimproved facilities, reduced access, and diminished habitat quality and wildlife use.	Both facilities and opportunities for interpretation would improve compared to Alternatives A or B due to increased emphasis and effort directed toward visitor services, including dedicated staff to develop and implement interpretive materials and facilities, and refuge expansions.
Camping	No camping would be permitted.	Same as Alternative A.	Same as Alternative A.
Access	Existing access routes and facilities would be maintained.	Access would generally decrease due to lack of road maintenance and beaver dam removal and associated flooding.	Access would be improved, as feasible, desirable, and compatible, to accommodate expanded public use opportunities compared to Alternatives A or B.
Refuge Administration			
Staffing	No planned increases in staffing; therefore, habitat and wildlife management and visitor services capability would remain unchanged.	Same as Alternative A, but with no management/maintenance programs, staff are under utilized, and staffing would be reduced as the need for their services diminished.	Hiring additional biological/resource, visitor services, law enforcement, maintenance, and administrative staff will increase the refuges' capability and capacity to achieve the purposes of the refuge and better serve the public compared to Alternatives A or B.

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
Volunteers and Partners	Volunteer and partnership programs remain unchanged, with productivity potential unattained.	Same as Alternative A, but with no management/maintenance programs, volunteers and partners are under utilized.	Expanded programs for volunteers, interns, partners, and Friends Groups enable the refuges to better manage wildlife, habitat, and visitor resources in fulfillment of refuge purposes and goals compared to Alternatives A or B.
Facilities, Infrastructure, and Equipment	Existing facilities, infrastructure, and equipment will be maintained and replaced as needed; capacity and capability remain unchanged.	Condition of facilities, infrastructure, and equipment would degrade along with diminished capacity for wildlife and habitat management and visitor services.	Improved, expanded, or additional facilities and infrastructure, including replacing existing offices with new headquarters/visitor contact stations at Bald Knob, Big Lake, and Wapanocca NWRs and construction of an environmental education/visitor center at Cache River NWR, would increase capacity and capability to better achieve the purposes of the refuges and serve the needs of the public as compared to Alternatives A or B.
Climate change	Definitive changes in climate not likely to be observable in the span of this CCP; ecological implications of changes to climate not predictable at the refuge scale at present.	Same as Alternative A.	Additional biological staff and partnerships, and consideration of refuge activities with respect to climate change may facilitate more responsive management programs, and more relevant monitoring and research efforts necessary for an improved understanding of climate change and its effect on refuge resources compared to Alternatives A or B,

Issues	Alternative A – Current Management (No Action Alternative)	Alternative B – Minimal Management	Alternative C – Enhanced Habitat and Public Use Management (Proposed Alternative)
			and would better enable adaptive management in response to impacts of climate change.
Litter and trash	Would continue to be a problem at a number of sites.	Litter may be reduced with declines in public use, but trash dumping may increase due to the perception that the Service has abandoned the land.	Same as Alternative A, except additional law enforcement, visitor services, and maintenance staff would enable the refuges to better control these problems and educate refuge visitors to take pride in the refuge and keep it clean.
Law enforcement	Refuge programs would continue to be subjected to inadequate law enforcement; problems such as trespass, poaching, and other illegal activities would not abate.	Law enforcement problems would likely increase due to the perception that the Service has abandoned the land.	Increased law enforcement staff should decrease illegal activities, increase protection of resources and visitors, and promote better outreach to the public compared to Alternatives A or B.

UNAVOIDABLE IMPACTS AND MITIGATION MEASURES

Under Alternative A – the no-action or current management direction alternative – there are a number of unavoidable impacts that include: inadequate law enforcement for protecting the refuges' resources and visitors; continual biological degradation to functional native plant and wildlife communities due to invasive plants and nuisance animals; severe hydrology, siltation, and water management problems; and a continual decline in biodiversity. If left unaddressed over time, these issues will cumulatively impact resources and visitors on the Complex's refuges.

Alternative B – the minimal management alternative – would entail even more unavoidable adverse impacts than Alternative A. Habitat, wildlife and public use, as well as fulfilling the establishment purposes of the four refuges would be seriously compromised or jeopardized if this alternative were selected. Allowing "nature to take its course," along with the loss of cropland and moist-soil units in conjunction with natural forest succession, would not benefit wildlife overall. Without forest habitat management treatments and beaver impoundment control measures, forests would become unstructured with a closed canopy, with increasing tree mortality due to expanded and extended flooding. In addition, without intervention and management efforts, irreparable damage and degradation would occur to the Complex's water bodies, such as Big Lake and Wapanocca Lake.

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

WATER QUALITY FROM SOIL DISTURBANCE AND USE OF HERBICIDES

Soil disturbance and siltation due to cooperative farming, water management activities, road and levee maintenance, and the construction of observation towers, boat ramps, and headquarters and visitor centers are expected to be minor and of short duration. To further reduce potential impacts, the refuges will use best management practices to minimize the erosion of soils into water bodies, including vegetative filter strips in farm units.

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

Long-term herbicide use for exotic plant control could result in minor damage to non-target plants on the refuges and adjacent land, and a slight decrease in water quality in areas prone to exotic plant infestation. Through the proper application of herbicides, however, this is expected to have a minor impact on the environment, with the long-term benefit of reducing or eliminating exotic plant infestations and improving wildlife habitat.

WILDLIFE DISTURBANCE

Disturbance to wildlife is an unavoidable consequence of management and public use programs. Disturbance as a result of management activities are typically temporary, short-term, and non-significant. Habitat manipulations directed toward enhancing conditions for priority species and their habitats may have unavoidable negative consequences for certain non-target wildlife, but these impacts are minimized to the extent possible and generally are confined to impacts at the individual scale, not the population level. While some public use activities such as wildlife observation may be

less disturbing than others, all of the public use activities proposed under the proposed alternative will be planned to avoid unacceptable levels of impact.

The known and anticipated levels of disturbance from the proposed alternative are not considered to be significant. Nevertheless, the refuges will manage public use activities to reduce impacts. Providing access for hunting and fishing opportunities and managing these uses with stipulations to ensure compatibility allow the consumptive use of renewable natural resources without adversely impacting other resources. Wildlife observation and photography may result in minimal disturbance to wildlife. If the refuges determine that impacts from an expanded visitor services program and the expected additional visitor uses are above acceptable levels beyond which compatibility cannot be ensured, those uses will be discontinued, restricted, or otherwise modified to other less sensitive areas.

VEGETATION DISTURBANCE

Management of moist-soil units and activities associated with forest management result in disturbance to vegetation, but it is offset by creating long-term impacts that are beneficial to habitats used by wildlife. Negative impacts could also result from the creation, extension, and maintenance of trails that require the clearing of non-sensitive vegetation along their length. This is expected to be a minor short-term impact. Habitat and vegetation disturbance would be minimized with replacement of office buildings at Bald Knob, Big Lake, and Wapanocca NWRs; the replacement of the maintenance shop and equipment storge shed at Big Lake NWR; and the expansion of the maintenance shop and equipment storage shed at Bald Knob NWR by constructing the new facilities in the same locations or close proximity to existing locations and within existing disturbed zones and therefore not requiring destruction of additional wildlife habitat.

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

USER GROUP CONFLICTS

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

EFFECTS ON ADJACENT LANDOWNERS

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

However, some negative impacts that may occur include a higher frequency of trespass onto adjacent private lands, and noise associated with increased traffic. To minimize these potential impacts the refuges will clearly mark refuge boundaries, maintain the refuges' existing parking facilities, use law enforcement, and provide increased educational efforts at headquarters, visitor contact stations, visitor center, and kiosks.

LAND OWNERSHIP AND SITE DEVELOPMENT

Land acquisition efforts by the Service could lead to changes in land use and recreational use patterns. However, most of the non-Service-owned lands within the refuges' approved acquisition boundaries are currently undeveloped. If these lands are acquired as additions to the refuges, they would be maintained in an undeveloped state, managed for native wildlife populations, and opened to compatible wildlife-dependent public uses, where feasible.

Potential development of the refuges' buildings, trails, and other improvements could lead to minor short-term negative impacts on plants, soils, and some wildlife species. When building the observation decks, towers, or boardwalks efforts would be made to use recycled products and environmentally sensitive, treated lumber. Any headquarters and visitor center will be constructed to be aesthetically pleasing to the community and to avoid any additional impacts to native plant communities. All construction activities would comply with the requirements of Section 404 of the Clean Water Act, Section 106 of the National Historic Preservation Act, Executive Order 11988, Floodplain Management, Americans with Disabilities Act, and other applicable regulatory requirements. Construction of new headquarters/visitor contact stations at Bald Knob, Big Lake, and Wapanocca NWRs; construction of new maintenance shop/equipment storage shed at Big Lake NWR; and expansion of the maintenance shop/equipment storage shed at Bald Knob NWR would occur in the same locations (i.e., existing office/shop complexes) so that additional wildlife habitat would not be destroyed. Energy and water-conserving features, and alternative energy sources (where feasible) would be incorporated into the design of these buildings to lessen environmental impacts.

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 non-federal) or person undertakes such other actions (40 CFR, 1508.7).

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

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

The Complex is not aware of any past, present, or future planned actions that would result in a significant cumulative impact when added to the refuges' proposed actions, as outlined in the proposed alternative.

Nevertheless, because of concerns expressed about the cumulative effects of hunting on other refuges in the southeast, this section analyzes and discusses in some detail the cumulative impacts of the hunting program of each alternative on a variety of resources at the Central Arkansas NWR Complex.

ANTICIPATED IMPACTS ON WILDLIFE SPECIES

Migratory Birds

The Service annually prescribes frameworks, or outer limits, for dates and times when hunting may occur, the number of migratory birds that may be taken and possessed, and permissible methods of take. These frameworks are necessary to allow state selections of season and limits for recreation and sustenance, aid federal, state, and tribal governments in the management of migratory game birds, and permit harvests at levels compatible with population status and habitat conditions. Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 CFR Part 20) establishing the frameworks from which states may select season dates, bag limits, shooting hours, and other options for each migratory bird hunting season. The frameworks are essentially permissive in that hunting of migratory birds would not be permitted without them. Thus, in effect, federal annual regulations both allow and limit the hunting of migratory birds.

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 USC 703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to “the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds,” and are updated annually [16 USC 704(a)]. This responsibility has been delegated to the Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four flyways for the primary purpose of managing migratory game birds. Each flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each state and province in that flyway. The Central Arkansas NWR Complex is within the Mississippi Flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rule-making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulations-development schedules, based on "early" and "late" hunting season regulations. Early hunting seasons pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands, migratory game birds other than waterfowl (e.g., dove, woodcock, rails) and special early waterfowl seasons (e.g., Teal, resident Canada Geese). Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl seasons not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties (USFWS 2006).

Under each of the three alternatives, including the proposed alternative, the only waterfowl hunting permitted on the Complex would be at Bald Knob and Cache River NWRs. Big Lake and Wapanocca NWRs are both sanctuaries and are thus closed to waterfowl hunting. Dove hunting is permitted on Bald Knob and Cache River NWRs within the federal and state season frameworks. However, dove hunting on these refuges is only allowed when refuge waterfowl seasons are in progress.

Bald Knob NWR is especially noted for its enormous numbers of wintering waterfowl, which have exceeded 650,000 birds. Mallards and Northern Pintail are the most numerous species with American Widgeons, Gadwalls, Northern Shovelers, Green-winged and Blue-winged Teals, Scaup, Ringnecked Ducks, and Wood Ducks being common. Wood Ducks and Hooded Mergansers nest on the refuge. The refuge lies in the heart of the largest pintail wintering area in the state. As many as 250,000 pintail have been recorded wintering on the refuge. Peak waterfowl use normally occurs from November-December. Waterfowl abundance and use appear relatively stable over the long term.

Waterfowl hunting at Bald Knob NWR for both ducks and geese runs concurrent with the state seasons and bag limits. However, many specific refuge regulations impose further restrictions on waterfowl hunters. The refuge experiences large annual fluctuations in the number of duck hunters, primarily due to the availability of flooded habitat elsewhere in the state. When parts of the state are extremely dry, there may be up to 150 waterfowl hunters each day for several days on the refuge. However, when the White, Cache, Arkansas, and Mississippi Rivers are at flood stage, creating tens of thousands of acres of waterfowl habitat and scattering hunters, the number of hunters at the refuge is general low, with as few as 20. As with most public hunting areas, the quality and success of a hunt are inversely proportional to the number of hunters utilizing the refuge.

Cache River NWR is also known for its waterfowl hunting opportunities and hunters enjoy relatively high success rates. The number of waterfowl hunters is not limited, but generally is self-regulated by hunting pressure, availability of water, and numbers of ducks on the refuge.

The generally healthy condition of waterfowl and dove populations along the Mississippi Flyway in recent years supports the conclusion that waterfowl and dove hunting at these two refuges are not contributing to any cumulative adverse impact on waterfowl or dove populations in either Arkansas or the Mississippi Flyway.

Because the Service is required to take the abundance of migratory birds and other factors into consideration, the Service conducts a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, state and provincial wildlife-management agencies, and others. In order to determine the appropriate frameworks for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of state and federal governments. After Service establishment of final frameworks for hunting seasons, the states may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the federal frameworks but never more liberal. Season dates and bag limits for national wildlife refuges open to waterfowl hunting are never longer or greater than the state regulations.

NEPA considerations by the Service for migratory game bird species are addressed by the programmatic document, ‘‘Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FSEIS 88–14),’’ filed with the Environmental Protection Agency on June 9, 1988. The Service published a notice of availability in the Federal Register on June 16, 1988 (53 FR 22582), and a Record of Decision on August 18, 1988

(53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under separate, tiered Environmental Assessments, "Duck Hunting Regulations for [YEAR]," and associated Findings of No Significant Impact (FONSI's). Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53376), the Service announced its intent to develop a new Supplemental EIS for the migratory bird hunting program. More information may be obtained from: Chief, Division of Migratory Bird Management, U.S. Fish and Wildlife Service, Department of the Interior, MS MBSP-4107-ARLSQ, 1849 C Street, NWR, Washington, DC 20240.

Resident Big Game

Deer

Deer hunting is permitted on all refuges in the Central Arkansas NWR Complex. On Bald Knob NWR, archery deer hunting is conducted concurrently with the state's archery season, which is October 1 – February 28. Muzzleloader hunting is allowed concurrent with the state's October muzzleloader season. Youth modern gun deer hunting is held the first weekend in November, concurrent with the state season. Quota (limited numbers of permits) modern gun hunting is held on the opening weekend of the state's modern gun season. At Big Lake NWR, archery deer hunting is permitted annually from November 1 – December 31. Archery deer hunting on Cache River NWR is held concurrently with the state's archery season. Muzzleloader hunting is conducted for 5 days during the state's October muzzleloader season and again during the full 3-day December season. The youth modern gun deer hunt is conducted during the state's youth hunt. The quota modern gun hunt on Cache River NWR is held on the first four days on the state season and again the next Friday, Saturday, and Sunday. At Wapanocca NWR, hunter numbers are controlled by lottery for the quota deer gun hunt, which is held during the opening weekend of the state modern gun season.

Hunter check stations are operated on each refuge, allowing the collection of deer harvest data. Managers review the deer harvest to guide future management decisions. Continuation of deer hunting on refuge lands should not have negative cumulative impacts on the deer herd and likely has a beneficial impact on habitats and deer herd health.

Eastern Wild Turkey

Hunting for Eastern Wild Turkey occurs at two of the four refuges in the Central Arkansas NWR Complex - Bald Knob and Cache River NWRs. At Bald Knob NWR, wild turkey hunting is allowed only on the Mingo Creek Unit, which is open for archery turkey hunting only. At Cache River NWR, fall turkey hunting is permitted refuge-wide with archery/crossbows only. Spring gun hunting is conducted concurrent with the State seasons on Hunt Units I and III, but Hunt Unit II spring hunting is allowed only in conjunction with the quota permit hunt on Black Swamp WMA/Cache River NWR, which is administered by AGFC.

Service biologists believe the turkey population can support the current modest, controlled hunting pressure, as evidenced by a stable turkey population. The refuges would continue to manage their turkey hunts in such a manner as to avoid cumulative adverse effects on turkey numbers and ensure compatibility.

Small Game

Small game species (e.g., squirrels, rabbits) are hunted on each of the refuges in the Complex. Refuge biologists believe small game populations can support the current modest, controlled hunting pressure they receive. The refuges would continue to manage their small game hunts in such a manner as to avoid cumulative adverse effects on small game numbers and ensure compatibility.

Furbearers

Raccoons and opossums are hunted on all for refuges in the Complex. Hunting is conducted within the state season framework, but the seasons vary widely in length from two weeks to several months, depending on the refuge. Beaver, nutria, muskrat, coyote, armadillo, and feral hog can be taken incidental to any refuge hunt and according to applicable state regulations. Participation is limited and the pursuit of these species poses little risk of cumulative impacts to target or non-target species. The refuges would continue to manage this activity to avoid cumulative adverse impacts and ensure compatibility.

Trapping of furbearers by special use permit is proposed for Cache River NWR December 1 – January 31 according to state regulations. Badgers, beaver, bobcat, coyote, gray fox, red fox, mink, muskrat, nutria, opossum, raccoon, river otter, spotted skunk, striped skunk, and weasel are regulated by AGFC as furbearers. Furbearer trapping is proposed to aid in control of nuisance furbearers (e.g., beaver, nutria, muskrat) that degrade refuge habitats and infrastructure, those that pose risk of disease transmission (e.g., raccoon, skunk, fox), and species that prey upon the nests and young of migratory birds (e.g., raccoon, skunk, possum, coyote). Additionally the activity will provide economic benefits for the local community. This activity will not result in long-term adverse impacts to the species at the population level, but will result in benefits for trust species and their habitats. The refuge will manage this use to ensure compatibility.

Traps must be checked daily and no trapping would be permitted on waterfowl sanctuaries. All trapped furbearers must be dispatched on-site and no live animals may be removed from the refuge.

Non-Hunted Wildlife

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

Disturbance to non-hunted migratory birds could have regional, local, and flyway effects. Regional and flyway effects would not be applicable to species that do not migrate, such as most woodpeckers and some songbirds including cardinals, titmice, wrens, and chickadees. The cumulative effects of disturbance to non-hunted migratory birds under the proposed alternative are expected to be negligible for the following reasons. Except for the spring turkey season, hunting seasons would not coincide with the nesting season. Long-term future impacts that could occur if reproduction was reduced by hunting are not relevant for this reason. Disturbance to the daily wintering activities of birds, such as feeding and resting, might occur. Disturbance to birds by hunters would probably be commensurate with that caused by non-consumptive users. These disturbances would be temporary, short-term, and generally non-repetitive.

With regard to other wildlife, disturbance would be unlikely for the following reasons. Many small mammals, including bats, are inactive during winter when hunting seasons occur (with the exception of the spring turkey season). Generally, these species are also nocturnal. Both of these qualities make hunter interactions with small mammals uncommon. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity during the hunting season when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Encounters with reptiles and amphibians in the early fall are few and should not have cumulative negative effects on reptile and amphibian populations. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

Some species of bats, butterflies, and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. These species are in torpor or have completely passed through central Arkansas by peak hunting season in November-January. Some hunting occurs during September through October when these species are migrating; however, hunter interaction with bats would be commensurate with that of non-consumptive users, which is minimal.

Threatened and Endangered Species

Federally listed species occurring or known to have historically occurred on Central Arkansas NWR Complex include one mollusk and three birds: the fat pocketbook mussel (Big Lake NWR), Ivory-billed Woodpecker (Cache River NWR), Least Tern (Bald Knob and Wapanocca NWRs), and Piping Plover (Bald Knob NWR).

An Intra-Service Section 7 evaluation under the Endangered Species Act is included as Appendix F in this Draft CCP-EA. It concludes that the proposed alternative would have no effect on these listed species. While some of these species may occur on the refuges, hunters are unlikely to mistake them for geese, ducks, turkeys, deer, squirrels, rabbits, raccoons, opossums, armadillos, nutria, beaver, or feral hogs. The cumulative adverse impact on listed species would be negligible, comparable to that caused by anglers, boaters and non-consumptive users.

ANTICIPATED IMPACTS ON REFUGE PROGRAMS, FACILITIES, CULTURAL RESOURCES, ENVIRONMENTAL JUSTICE, ENVIRONMENTAL RESOURCES, AND SURROUNDING COMMUNITIES

Wildlife-Dependent Recreation

As public use levels expand when projected over time, unanticipated conflicts between user groups possibly could occur at the Central Arkansas NWR Complex. Accordingly, the refuges' visitor programs would be adjusted as needed, to eliminate or minimize each problem and provide safe, quality wildlife-dependent recreational opportunities that are compatible with refuge purposes and Refuge System mission. Experience on many national wildlife refuges 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. Overall, the cumulative impacts of wildlife-dependent recreation on the Central Arkansas NWR Complex would be negligible to minor.

Refuge Facilities

The Service defines facilities as: "Real property that serves a particular function(s) such as buildings, roads, utilities, water control structures, raceways, etc." Those facilities most utilized by hunters and

anglers 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 temporary and short-term wildlife disturbances and damage to vegetation. The facility maintenance and improvement activities, as described, are periodically conducted to accommodate daily refuge management operations and visitation by the general public. These activities would be conducted at times (seasonal and/or daily) that cause the least amount of disturbance to wildlife. Siltation barriers or other erosion control measures would be used to minimize soil erosion when necessary and all disturbed sites would be restored to as natural condition as possible. Construction of new headquarters/visitor contact stations at Bald Knob, Big Lake, and Wapanocca NWRs, which would be used by hunters, anglers, and other visitors, would occur in the same locations (i.e., existing office/shop complexes) so that additional wildlife habitat would not be destroyed. When roads are impassible due to flood events or other natural causes, the associated roads, parking lots, trails and boat ramps impacted by the event would be closed to vehicular use.

Overall, the cumulative impacts of hunting on the facilities at the Central Arkansas NWR Complex would be negligible.

Cultural Resources

Hunting, fishing, and trapping are consumptive activities that do not pose any threat to historic properties on or near the refuges, nor do other public use activities that occur on the Complex. In fact, public uses on the refuges meet only the latter of the two criteria used to identify an "undertaking" that triggers a federal agency's need to comply with Section 106 of the National Historic Preservation Act. These criteria, which are delineated in 36 CFR Part 800, state:

1. an undertaking is any project, activity, or program that can alter the character or use of an archaeological or historic site located within the "area of potential effect;" and
2. the project, activity, or program must also be either funded, sponsored, performed, licensed, or have received assistance from the agency.

Consultation with the pertinent State Historic Preservation Offices and federally recognized Tribes are, therefore, not required.

Environmental Justice

Executive Order 12898 "Federal Actions to address Environmental Justice in Minority Populations and Low-income Populations" was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations to achieve environmental protection of all communities. In part, the order intended to promote nondiscrimination in federal programs substantially affecting human health and the environment and to provide minority and low-income communities' access to public information and participation in matters relating to human health or the environment.

There are low-income and minority populations in the area but there is no evidence of adverse disproportionate environmental justice issues associated with the refuges' existing or proposed hunting programs. Any affected population would generally be affected in the same way as the regional population as a whole.

Environmental Resources

No appreciable adverse impacts are expected with implementation of the proposed alternative on the refuges' environments, which consist of soils, vegetation, air quality, water quality and solitude. Some disturbance to surface soils and vegetation would occur in areas selected for hunting and fishing; however, impacts would be minor and localized. Litter left behind by hunters and other users would also be expected, although unlike the litter associated with fishing, which often concentrates near or at certain heavily fished locations, litter from hunters is likely to be more widely dispersed and therefore less conspicuous. Hunting and trapping would be expected to benefit vegetation, since it is used to maintain many resident wildlife populations, particularly deer and beaver, in balance with the habitat's carrying capacity and to prevent habitat degradation. When and where necessary, the refuges would also control access to or close areas to the public to minimize habitat degradation.

The refuges expect impacts to air and water quality to be minimal and only due to refuge visitors' automobile, ATV, and outboard motor emissions. The effect of these refuge visitor-related activities, as well as other refuge management-related activities, on overall air and water quality in the region are anticipated to be negligible, compared to the contributions of industrial centers, power plants, and non-refuge vehicle traffic in this portion of Arkansas. Existing state water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of the proposed action and alternatives would not impact adjacent landowners or users beyond the constraints already implemented under existing state standards and laws.

Overall, impacts on solitude are expected to be minor, given time and space zone management techniques, such as seasonal access and area closures, used to avoid conflicts among user groups and provide for public safety. However, during times when the refuges are being heavily hunted, users seeking solitude rather than game may be disappointed and want to avoid popular hunt areas on the refuges.

Surrounding Communities

The refuges would cooperate with state, federal, and private partners to minimize adverse impacts on adjacent lands and their natural resources. The nature of impacts on surrounding communities is less cumulative than it is long-running and persistent. Hunting and fishing are generally popular in this part of rural Arkansas, but these activities can contribute to certain conflicts with adjacent landowners; yet many residents in the surrounding area and neighboring communities are likely to view continued hunting and fishing opportunities favorably. The refuges expect that continuing visitation and tourism, some of it due to hunting, fishing, and wildlife observation, will generate revenues to local communities, but this spending would be small in comparison to the size of the local economy.

Any concerns of neighboring landowners can best be addressed through increased education and law enforcement which are contemplated under Alternatives A and C.

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 and are manifested later in time or are further removed in distance, but still reasonably foreseeable.

The actions proposed for implementation under the proposed alternative include facility maintenance and development, wildlife habitat and population management, resource protection, public use, and administrative programs. These actions would result in both direct and indirect effects. Facility

development, for example, would most likely lead to increased public use, which is a direct effect. In turn, increased public use 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 siltation impacts due to the disturbance of soils and vegetation while expanding and operating water control structures, performing cropland or forest management operations, expanding or creating new foot trails, constructing observation tower(s) and office/visitor centers, and providing improvements to boat ramps.

All in all, both direct and indirect effects on all four refuges from the alternatives would be on a temporary, small, or localized scale and be generally negligible to minor in their intensity or magnitude.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

The habitat protection and management actions proposed under the proposed alternative are dedicated to maintaining the long-term productivity of refuge habitats. The benefits of this CCP for long-term productivity far outweigh any impacts from short-term actions, such as the construction of an observation tower(s) and a visitor center, or creation of new trails and boat ramps. While these activities would cause short-term negative impacts, the educational values and associated public support gained from the improved visitor experience would result in long-term benefits for achieving refuges' purposes.

The key to protecting and ensuring the refuges' long-term productivity is to find the threshold where public uses do not degrade or interfere with the refuges' natural resources. The plans proposed 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, land conservation, and visitor services that far outweigh any short-term impacts.

Appendix A. Glossary

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

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

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

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

CFR: Code of Federal Regulations.

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

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

Concern: See Issue

Cover Type: The present vegetation of an area.

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

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

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

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

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

Ecosystem: A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.

Ecosystem Management: Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.

Endangered Species (Federal):	A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.
Endangered Species (State):	A plant or animal species in danger of becoming extinct or extirpated in the state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.
Environmental Assessment (EA):	A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).
Environmental Impact Statement (EIS):	A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).
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.
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 Improvement Act, the Fish and Wildlife Service is required to develop 15-year comprehensive conservation plans for all national wildlife refuges outside Alaska. The Act also describes the six public uses given priority status within the Refuge System (i.e., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation).
National Wildlife Refuge System Mission:	The mission is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.
National Wildlife Refuge System:	Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters, and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; game ranges; wildlife management areas; or waterfowl production areas.
National Wildlife Refuge:	A designated area of land, water, or an interest in land or water within the Refuge System.
Native Species:	Species that normally live and thrive in a particular ecosystem.

Noxious Weed: A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States. According to the Federal Noxious Weed Act (P.L. 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the 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. Objectives should be specific, measurable, attainable, results-oriented, and time-specific (Service Manual 602 FW 1.6N).

Plant Association: A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.

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

Preferred Alternative: This is the alternative determined (by the decision-maker) to best achieve the refuge purpose, vision, and goals; contributes to the National Wildlife Refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management.

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

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

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

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

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

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

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 small to medium, perching landbirds. Most are territorial singers and migratory.

Step-down Management Plan: A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, and safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives (Service Manual 602 FW 1.6 U).

Strategy: A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.6 U).

Study Area: The area reviewed in detail for wildlife, habitat, and public use potential. For purposes of this CCP, the study area includes the lands within the currently approved refuge boundary and potential refuge expansion areas.

Threatened Species (Federal):	Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
Threatened Species (State):	A plant or animal species likely to become endangered in the state within the near future if factors contributing to population decline or habitat degradation or loss continue.
Tiering:	The coverage of general matters in broader environmental impact statements with subsequent narrower statements of environmental analysis, incorporating by reference, the general discussions and concentrating on specific issues (40 CFR 1508.28).
U.S. Fish and Wildlife Service Mission:	The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.
Unit Objective:	See Objective
Vegetation Type, Habitat Type, Forest Cover Type:	A land classification system based upon the concept of distinct plant associations.
Vision Statement:	A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates. We will tie the vision statement for the refuge to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates (Service Manual 602 FW 1.6 Z).
Wilderness:	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

ADA	Americans with Disabilities Act
ADEQ	Arkansas Department of Environmental Quality
AGFC	Arkansas Game and Fish Commission
AHTD	Arkansas Highways and Transportation Department
AHWP	Annual Habitat Work Plan
ANRC	Arkansas Natural Resources Commission
ATV	All Terrain Vehicle
BLHP	Bicentennial Land Heritage Program
BMP	Best Management Practices
CCC	Civilian Conservation Corp
CCP	Comprehensive Conservation Plan
CD	Compatibility Determination
CFI	Continuous Forest Inventory
CFR	Code of Federal Regulations
CMP	Comprehensive Management Plan
COE	U.S. Army Corps of Engineers
Complex	Central Arkansas National Wildlife Refuges Complex
CREP	Conservation Reserve Enhancement Program
CRMP	Cultural Resources Management Plan
CRP	Conservation Reserve Program
CSP	USDA, Conservation Security Program
dbh	diameter at breast height
DDT	Dichloro-Diphenyl-Trichlorethane
DED	Duck Energy Days
DFC	Desired Forest Conditions
DU	Ducks Unlimited
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EPI	Equipment Priority Index
FBBDSM	Forest Breeding Bird Decision Support Model
FEMA	Federal Emergency Management Agency
FHMP	Forest Habitat Management Plan
FONSI	Findings on No Significant Impact

FR	Federal Register
FRCWG	Forest Resource Conservation Working Group
FSA	USDA, Farm Service Agency
GIS	Geographic Information Systems
GPS	Global Positioning System
GS	General Schedule
GTR	Greentree reservoirs
IBWO	Ivory-billed Woodpecker
IMP	Inventory and Monitoring Plan
LE	Law Enforcement
LMRE	Lower Mississippi River Ecosystem
LMV	Lower Mississippi Valley
LMVJV	Lower Mississippi Valley Joint Venture
MAV	Mississippi Alluvial Valley
MIS	Monitoring, Inventories, and Surveys
MOU	Memorandum of Understanding
Msl	mean sea level
NAAMP	North American Amphibian Monitoring Program
NAWCA	North American Wetlands Conservation Act
NAWMP	North American Waterfowl Management Plan
NEPA	National Environmental Policy Act
NGO	Non-government Organization
NGVD	National Geodetic Vertical Datum
NRCS	USDA, Natural Resource Conservation Service
NWR/Refuge	National Wildlife Refuge
NWRS	National Wildlife Refuge System
PCB	Polychlorinated Biphenyls
PIF	Partners In Flight
RLGIS	Refuge Lands Geographic Information System
RO	USFWS, Regional Office, Atlanta, GA
RONS	Refuge Operating Needs System
SAMMS	Service Asset Management Maintenance System
SCWDS	Southeast Cooperative Wildlife Disease Study
SUP	Special Use Permit
TNC/ Conservancy	The Nature Conservancy
TSI	Timber Stand Improvement

UAM	University of Arkansas at Monticello, Arkansas
USC	United States Code
USDA	United States Department of Agriculture
USFWS/Service	U.S. Fish and Wildlife Service
USGS	U.S. Geological Service
USGS-BRD	U.S. Geological Service - Biological Resources Division
WG	Wage Grade
WMA	Wildlife Management Area
WRP	Wetland Reserve Program
YCC	Youth Conservation Corp

Appendix B. References and Literature Citations

Arkansas Department of Environmental Quality. 2005. Integrated water quality monitoring and assessment report, 2004. Arkansas Department of Environmental Quality, Little Rock, AR. Report No. WQ05-07-01.

Arkansas Game and Fish Commission. 1989. A proposal for designation of protected areas within the Cache/Lower White Rivers Joint Venture Project as "Wetlands of International Importance". AGFC unpublished report Little Rock, AR.

Arkansas Soil and Water Conservation Commission. 1988. Arkansas state water plan: Eastern Arkansas Basin. Little Rock, AR. 255pp.

Baldassarre, G. A. & E. G. Bolen. 1994. Waterfowl Ecology and Management. John Wiley & Sons, Inc. New York, NY. Pages 397-400.

Baxter, C.K., and J.C. Sunderland. 1985. Agricultural development in the lower Mississippi valley: Can public policies and programs become a motivation for conservation? Presentation at the Soil Conservation Society of America Annual Meeting St. Louis, MO. 9pp.

Cely, J. E. and J. A. Sorrow. 1990. The American Swallow-tailed Kite in South Carolina. Nongame and Heritage Trust Fund Publication 1. South Carolina Wildlife and Marine Resources Department, Columbia, SC.

Christian, A.D, J.L. Harris, W.R. Posey, J.F. Hockmuth, and G.L. Harp. 2005. Freshwater Mussel (Bivalvia: Unionidae) Assemblages of the Lower Cache River, Arkansas. Southeastern Naturalist 4(3):487-512.

Cleaveland, M.K., D.W. Stahle, and J.G. Hehr. 1988. Long-term reconstruction and analysis of White River streamflow. Arkansas Water Resources Research Ctr. Tech. Completion Rept G-1409-02. University of Arkansas. Fayetteville, AR.

Dupree, A. H. 1957. Science in the Federal Government: A History of Policies and Activities to 1940. Harvard University Press, Cambridge, MA. 460 pp.

Ecological Consultants, Inc. 1983. Mussel (Naiad) survey: St. Francis, White, and Cache Rivers, Arkansas and Missouri. Final Report. U.S. Army Engineer District, Memphis, TN. 62 pp. + appendices.

Fararman, K.R. and C.A. DeYoung. 1986. Evaluation of spotlight counts in South Texas. Wildlife Society Bulletin. 14:180-185.

Fredrickson, L.H., and T.S. Taylor. 1982. Management of seasonally flooded impoundments for wildlife. U.S. Fish and Wildlife Service Resource Publication 148, Washington, DC, USA.

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

Freiwald, D. A. 1985. Average annual precipitation and runoff for Arkansas, 1951-80. USDI Geological Survey Water Resources Investigation Report 84-4363. 1 sheet.

Gabrielson, I. N. 1943. Wildlife Conservation. The Macmillan Company, New York, NY. 250 pp.

Gordon, M.E., L.R. Kraemer, and A.V. Brown. 1980. Unionaceae of Arkansas: Historical review, checklist, and observations on distributional patterns. Bulletin of the American Malacological Union 1979:31-37.

Hamel, P. B., W. P. Smith, D. J. Twedt, J. R. Woehr, E. Morris, R. B. Hamilton, and R. J. Cooper. 1996. A land manager's guide to point counts of birds in the Southeast. Gen. Tech. Rep. SO-120. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Research Station. 39 pp.

Hupp, C.R., and E.E. Morris. 1990. A dendrogeomorphic approach to sedimentation in a forested wetland, Black Swamp, Arkansas. Wetlands 10(1):107-124.

Hunter, C.B., and Golder. In prep. Draft of the Southeast U.S. Waterbird Conservation Plan. USFWS, Atlanta, GA.

Jenkinson, J.J., and S.A. Ahlstedt. 1988. A search for additional populations of *Potamilus capax* in the St. Francis and Cache River watersheds, Arkansas and Missouri, Prepared for US Army Corps of Engineers, Memphis District, Vicksburg, MS. 304 pp.

Killgore, K.J., J.A. Baker. 1996. Patterns of Larval Fish Abundance in a Bottomland Hardwood Wetland. Wetlands 16(3):288-295.

Killgore, K.J., and G.L. Miller. 1995. Larval Fish Dynamics in Oxbow Lakes With Varying Connections to a Temperate River. Technical Report WRP-SM-11, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Kleiss, B. 1996. Sediment retention in a bottomland hardwood wetland in eastern Arkansas. Wetlands 16(3):321-333.

Krementz, D.G., and J.J. Jackson. 1999. Woodcock in the Southeast: Natural History & Management for Landowners. The University of Georgia College of Agriculture and Environmental Sciences, Cooperative Extension Service. Bulletin 1183. 16 pp.

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

Laycock, G. 1965. The Sign of the Flying Goose: A Guide to the National Wildlife Refuges. The Natural History Press, Garden City, New York, NY. 299 pp.

Loesch, C.R., K.J. Reinecke, and C.K. Baxter. 1994. Lower Mississippi Valley Joint Venture Evaluation Plan. U.S. Fish and Wildlife Service, Lower Mississippi Valley Joint Venture, Vicksburg, MS.

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

Mauney, M., and G.L. Harp. 1979. The Effects of Channelization on Fish Populations of the Cache River and Bayou DeView. Arkansas Academy of Science Proceedings, Vol. XXXIII.

McCullough, D.R. 1982. Evaluation of night spotlighting as a deer study technique. Journal of Wildlife Management. 46:963-973.

Mueller, A.J., D.J. Twedt, S.E. Mott, C.K. Baxter. C.R. Brown, R.J. Cooper, R.P. Ford, P.B. Hamell, W.C. Hunter, D.N. Pashley, and M.S. Woodrey. 1999. Migratory bird conservation planning in the Mississippi Alluvial Valley. Unpublished Report. 31 pp.

Neu. C.W., C.R. Byers, and J.W. Peek. 1974. A technique to analysis of utilization-availability data. Journal of Wildlife Management. 38:541-545.

Petersen, J.C. 1988. Statistical summary of selected water-quality data (water years 1975 through 1985) for Arkansas rivers and streams. USGS Technical Report. 88-4112.

Petersen, J.C. 1990. Trends and comparison of water quality and bottom material of northeastern Arkansas streams, 1974-85, and effects of planned diversions. USGS Tech. Report 90-4017.

Reinecke, K.J., R.M. Kaminski, D.J. Moorhead, J.D. Hodges, and J.R. Nassar. 1989. Mississippi Alluvial Valley. Pages 203-247 in L.M. Smith, R.L. Pederson, and R.M. Kaminski, editors Habitat management for migrating and wintering waterfowl in North America. Texas Technical University Press, Lubbock, TX. 560 pp.

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

Shea, D., C.S. Hofelt, D.R. Luellen, A. Huysman, P.R. Lazaro, R. Zarzecki, and J.R. Kelly. 2002. Chemical contamination at National Wildlife Refuges in the Lower Mississippi River Ecosystem. Report by North Carolina State University to the U.S. Fish and Wildlife Service, Atlanta, GA. 40pp.

Smith, L.M., R.L. Pederson, and R.M. Kaminski. 1989. Habitat management for migrating and wintering waterfowl in North America. Lubbock, TX, USA. Texas Technical University Press.

Stahle, D.W., M.K. Cleaveland, and J.G. Hehr. 1985. A 450-year drought reconstruction for Arkansas, United States. Nature 316(6028):530-532.

Strader, R.W. and P.H. Stinson. 2005. Moist-soil guidelines for the U.S. Fish and Wildlife Service, Southeast Region. Migratory Bird Field Office, Division of Migratory Birds, U.S. Fish and Wildlife Service. 17 pp + appendices.

Tanner, J.T. 1942. The Ivory-billed Woodpecker. Dover publications.

Thompson III, F. R., J. R. Probst, and M. G. Raphael. 1993. Silvicultural Options for Neotropical Migratory Birds. Pages 353-362 in D. M. Finch and P. W. Stangel, editors. Status and Management of Neotropical Migratory Birds. U.S.D.A. Forest Service, General Technical Report RM-229. Rocky Mountain. Forest and Range Experiment Station., Fort Collins, CO. 422 pp.

Twedt, D., D. Pashley, C. Hunter, A. Mueller, C. Brown, and B. Ford. 1999. Partners in Flight Conservation Plan for the Mississippi Alluvial Valley.

U.S. Dept. of the Interior. 1984. National water summary 1983. U.S. Geological Survey Water-Supply Paper 2250. 243pp.

U.S. Dept. of Interior, Fish and Wildlife Service. 1990. American Woodcock management plan. 11 pp.

U.S. Fish and Wildlife Service. 2008. Bald Knob and Cache River National Wildlife Refuges. Biological Review – Final Report.

U.S. Fish and Wildlife Service. 2007a. Big Lake and Wapanocca National Wildlife Refuges. Biological Review – Final Report.

U.S. Fish and Wildlife Service. 2007b. Draft Recovery Plan for the Ivory-billed Woodpecker (*Campephilus principalis*). U. S. Fish and Wildlife Service, Atlanta, GA. 182 pp.

Wheeler, H.E. 1914. The unione fauna of Cache River, with description of a new Fusconaia from Arkansas. Nautilus 28:72-78.

Whipple, J.D., D. Rollins, W.H. Schacht 1994. A field simulation for assessing accuracy of spotlight deer surveys. Wildlife Society Bulletin 22:667-673.

Williams, L.E. Jr. 1981. The book of the wild turkey. Winchester Press, Tulsa, OK. 181 pp.

Wilson, R. et. al. 2000. Mississippi Alluvial Valley Shorebird Conservation Plan.

Appendix C. Relevant Legal Mandates and Executive Orders

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

STATUTE	DESCRIPTION
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.
Emergency Wetlands Resources Act of 1986	This Act authorized the purchase of wetlands from Land and Water Conservation Fund accounts, removing a prior prohibition on such acquisitions. The Act requires the Secretary to establish a National Wetlands Priority Conservation Plan, required the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amounts equal to import duties on arms and ammunition. It also established entrance fees at national wildlife refuges.
Endangered Species Act of 1973, as amended	Provides for the conservation of threatened and endangered species of fish, wildlife, and plants by federal action and by encouraging the establishment of state programs. It provides for the determination and listing of threatened and endangered species and the designation of critical habitats. Section 7 requires refuge managers to perform internal consultation before initiating projects that affect or may affect endangered species.
Environmental Education Act of 1990	This Act established the Office of Environmental Education within the U.S. Environmental Protection Agency to develop and administer a federal environmental education program in consultation with other federal natural resource management agencies, including the Fish and Wildlife Service.
Food Security Act of 1985, as amended (Farm Bill)	The Act contains several provisions that contribute to wetland conservation. The Swampbuster provisions state that farmers who convert wetlands for the purpose of planting after enactment of the law are ineligible for most farmer program subsidies. It also established the Wetland Reserve Program to restore and protect wetlands through easements and restoration of the functions and values of wetlands on such easement areas.
Farmland Protection Policy Act of 1981, as amended	The purpose of this law is to minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. Federal programs include construction projects and the management of federal lands.

STATUTE	DESCRIPTION
Federal Advisory Committee Act (1972), as amended	Governs the establishment of and procedures for committees that provide advice to the federal government. Advisory committees may be established only if they will serve a necessary, nonduplicative function. Committees must be strictly advisory unless otherwise specified and meetings must be open to the public.
Federal Coal Leasing Amendment Act of 1976	Provided that nothing in the Mining Act, the Mineral Leasing Act, or the Mineral Leasing Act for Acquired Lands authorized mining coal on refuges.
Federal-Aid Highways Act of 1968	Established requirements for approval of federal highways through national wildlife refuges and other designated areas to preserve the natural beauty of such areas. The Secretary of Transportation is directed to consult with the Secretary of the Interior and other federal agencies before approving any program or project requiring the use of land under their jurisdiction.
Federal Noxious Weed Act of 1990, as amended	The Secretary of Agriculture was given the authority to designate plants as noxious weeds and to cooperate with other federal, State and local agencies, farmers' associations, and private individuals in measures to control, eradicate, prevent, or retard the spread of such weeds. The Act requires each Federal land-managing agency, including the Fish and Wildlife Service, to designate an office or person to coordinate a program to control such plants on the agency's land and implement cooperative agreements with the states, including integrated management systems to control undesirable plants.
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.

STATUTE	DESCRIPTION
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.
Fish and Wildlife Improvement Act of 1978	This act was passed to improve the administration of fish and wildlife programs and amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary 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.
Freedom of Information Act, 1966	Requires all federal agencies to make available to the public for inspection and copying administrative staff manuals and staff instructions; official, published and unpublished policy statements; final orders deciding case adjudication; and other documents. Special exemptions have been reserved for nine categories of privileged material. The Act requires the party seeking the information to pay reasonable search and duplication costs.
Geothermal Steam Act of 1970, as amended	Authorizes and governs the lease of geothermal steam and related resources on public lands. Section 15 c of the Act prohibits issuing geothermal leases on virtually all Service-administrative lands.
Lacey Act of 1900, as amended	Originally designed to help states protect their native game animals and to safeguard U.S. crop production from harmful foreign species, this Act prohibits interstate and international transport and commerce of fish, wildlife or plants taken in violation of domestic or foreign laws. It regulates the introduction to America of foreign species.
Land and Water Conservation Fund Act of 1948	This Act provides funding through receipts from the sale of surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources for land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies, including the Fish and Wildlife Service.
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.

STATUTE	DESCRIPTION
Migratory Bird Hunting and Conservation Stamp Act of 1934	Also commonly referred to as the “Duck Stamp Act,” requires waterfowl hunters 16 years of age or older to possess a valid federal hunting stamp. Receipts from the sale of the stamp are deposited into the Migratory Bird Conservation Fund for the acquisition of migratory bird refuges.
Migratory Bird Treaty Act of 1918, as amended	This Act implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Except as allowed by special regulations, this Act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, barter, export or import any migratory bird, part, nest, egg, or product.
Mineral Leasing Act for Acquired Lands (1947), as amended	Authorizes and governs mineral leasing on acquired public lands.
Minerals Leasing Act of 1920, as amended	Authorizes and governs leasing of public lands for development of deposits of coal, oil, gas, and other hydrocarbons; sulphur; phosphate; potassium; and sodium. Section 185 of this title contains provisions relating to granting rights-of-way over federal lands for pipelines.
Mining Act of 1872, as amended	Authorizes and governs prospecting and mining for the so-called “hardrock” minerals (i.e., gold and silver) on public lands.
National and Community Service Act of 1990	Authorizes several programs to engage citizens of the U.S. in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Among other things, this law establishes the American Conservation and Youth Service Corps to engage young adults in approved human and natural resource projects, which will benefit the public or are carried out on federal or Indian lands.
National Environmental Policy Act of 1969	Requires analysis, public comment, and reporting for environmental impacts of federal actions. It stipulates the factors to be considered in environmental impact statements, and requires that federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unqualified environmental values are given appropriate consideration, along with economic and technical considerations.
National Historic Preservation Act of 1966, as amended	It establishes a National Register of Historic Places and a program of matching grants for preservation of significant historical features. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register.

STATUTE	DESCRIPTION
National Trails System Act (1968), as amended	Established the National Trails System to protect the recreational, scenic, and historic values of some important trails. National recreation trails may be established by the Secretaries of Interior or Agriculture on land wholly or partly within their jurisdiction, with the consent of the involved state(s), and other land managing agencies, if any. National scenic and national historic trails may only be designated by Congress. Several national trails cross units of the National Wildlife Refuge System.
National Wildlife Refuge System Administration Act of 1966	Prior to 1966, there was no single federal law that governed the administration of the various national wildlife refuges that had been established. This Act defines the National Wildlife Refuge System and authorizes the Secretary of the Interior to permit any use of a refuge provided such use is compatible with the major purposes(s) for which the refuge was established.
National Wildlife Refuge System Improvement Act of 1997	This Act amends the National Wildlife Refuge System Administration Act of 1966. This Act defines the mission of the National Wildlife Refuge System, establishes the legitimacy and appropriateness of six priority wildlife-dependent public uses, establishes a formal process for determining compatible uses of Refuge System lands, identifies the Secretary of the Interior as responsible for managing and protecting the Refuge System, and requires the development of a comprehensive conservation plan for all refuges outside of Alaska.
Native American Graves Protection and Repatriation Act of 1990	Requires federal agencies and museums to inventory, determine ownership of, and repatriate certain cultural items and human remains under their control or possession. The Act also addresses the repatriation of cultural items inadvertently discovered by construction activities on lands managed by the agency.
Neotropical Migratory Bird Conservation Act of 2000	Establishes a matching grant program to fund projects that promote the conservation of neotropical migratory birds in the united States, Latin America, and the Caribbean.
North American Wetlands Conservation Act of 1989	Provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, the United States, and Mexico. The North American Wetlands Conservation Council was created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. Available funds may be expended for up to 50 percent of the United States' share cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on federal lands).

STATUTE	DESCRIPTION
Refuge Recreation Act of 1962, as amended	This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife-oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.
Partnerships for Wildlife Act of 1992	Establishes a Wildlife Conservation and Appreciation Fund to receive appropriated funds and donations from the National Fish and Wildlife Foundation and other private sources to assist the state fish and game agencies in carrying out their responsibilities for conservation of non-game species. The funding formula is no more that 1/3 federal funds, at least 1/3 foundation funds, and at least 1/3 state funds.
Refuge Revenue Sharing Act of 1935, as amended	Provided for payments to counties in lieu of taxes from areas administered by the Fish and Wildlife Service. Counties are required to pass payments along to other units of local government within the county, which suffer losses in tax revenues due to the establishment of Service areas.
Rehabilitation Act of 1973	Requires nondiscrimination in the employment practices of federal agencies of the executive branch and contractors. It also requires all federally assisted programs, services, and activities to be available to people with disabilities.
Rivers and Harbors Appropriations Act of 1899, as amended	Requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States. The Fish and Wildlife Coordination Act provides authority for the Service to review and comment on the effects on fish and wildlife activities proposed to be undertaken or permitted by the Corps of Engineers. Service concerns include contaminated sediments associated with dredge or fill projects in navigable waters.
Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948	This Act provides that upon determination by the Administrator of the General Services Administration, real property no longer needed by a federal agency can be transferred, without reimbursement, to the Secretary of the Interior if the land has particular value for migratory birds, or to a state agency for other wildlife conservation purposes.
Transportation Equity Act for the 21st Century (1998)	Established the Refuge Roads Program, requires transportation planning that includes public involvement, and provides funding for approved public use roads and trails and associated parking lots, comfort stations, and bicycle/pedestrian facilities.

STATUTE	DESCRIPTION
Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended	Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.
Water Resources Planning Act of 1965	Established Water Resources Council to be composed of Cabinet representatives including the Secretary of the Interior. The Council reviews river basin plans with respect to agricultural, urban, energy, industrial, recreational and fish and wildlife needs. The act also established a grant program to assist States in participating in the development of related comprehensive water and land use plans.
Wild and Scenic Rivers Act of 1968, as amended	This Act selects certain rivers of the nation possessing remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values; preserves them in a free-flowing condition; and protects their local environments.
Wilderness Act of 1964, as amended	This Act directs the Secretary of the Interior to review every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The Act permits certain activities within designated wilderness areas that do not alter natural processes. Wilderness values are preserved through a “minimum tool” management approach, which requires refuge managers to use the least intrusive methods, equipment, and facilities necessary for administering the areas.
Youth Conservation Corps Act of 1970	Established a permanent Youth Conservation Corps (YCC) program within the Departments of Interior and Agriculture. Within the Service, YCC participants perform many tasks on refuges, fish hatcheries, and research stations.

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

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

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

Appendix D. Appropriate Use Determinations

Central Arkansas National Wildlife Refuge Complex Appropriate Use Determinations (Bald Knob, Big Lake, Cache River, and Wapanocca NWRs)

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

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

- The six wildlife-dependent recreational uses as defined by the National Wildlife Refuge System Improvement Act of 1997; these are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. However, the refuge manager must still determine if these uses are compatible before allowing them on a refuge.

- The take of fish and wildlife under state regulations. States have regulations concerning take of wildlife that includes hunting, fishing, and trapping. The Service considers take of wildlife under such regulations appropriate. However, the refuge manager must determine if these uses are compatible before allowing them on a refuge.

Statutory Authorities for this policy:

National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd-668ee. This law provides the authority for establishing policies and regulations governing refuge uses, including the authority to prohibit certain harmful activities. The Act does not authorize any particular use, but rather authorizes the Secretary of the Interior to allow uses only when they are compatible and "under such regulations as he may prescribe." This law specifically identifies certain public uses that, when compatible, are legitimate and appropriate uses within the Refuge System. The law states ". . . it is the policy of the United States that . . .compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System . . .compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management; and . . . when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated . . . the Secretary shall . . . ensure that priority general public uses of the System receive enhanced consideration over other general public uses in planning and management within the System . . . ." The law also states "in administering the System, the Secretary is authorized to take the following actions: . . . issue regulations to carry out this Act." This policy implements the standards set in the Act by providing enhanced consideration of priority general public uses and ensuring other public uses do not interfere with the refuge's ability to provide quality, wildlife-dependent recreational uses.

Refuge Recreation Act of 1962, 16 U.S.C. 460k. The Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

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

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

Definitions:

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

1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
3) The use involves the take of fish and wildlife under state regulations.
4) The use has been found to be appropriate based on the sound, professional judgment of the refuge manager according to the decision criteria specified in the Finding of Appropriateness checklist (see Findings of Appropriateness below).

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

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

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

- Promotes safety of participants, other visitors, and facilities.
- Promotes compliance with applicable laws and regulations and responsible behavior.
- Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives in a plan approved after 1997.
- Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation.
- Minimizes conflicts with neighboring landowners.
- Promotes accessibility and availability to a broad spectrum of the American people.

- Promotes resource stewardship and conservation.
- Promotes public understanding and increases public appreciation of America's natural resources and the Service's role in managing and protecting these resources.
- Provides reliable/reasonable opportunities to experience wildlife.
- Uses facilities that are accessible and blend into the natural setting.
- Uses visitor satisfaction to help define and evaluate programs.

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Bald Knob National Wildlife Refuge

Use: Research and Monitoring

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Bald Knob National Wildlife Refuge

Use: Forest Products Harvesting

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Bald Knob National Wildlife Refuge

Use: Commercial Guiding for Wildlife Observation and Photography

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Bald Knob National Wildlife Refuge

Use: Commercial Video and Photography

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

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

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

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

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

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

Not Appropriate_____ **Appropriate**__X__

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Bald Knob 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.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Bald Knob National Wildlife Refuge

Use: Nuisance Animal Control

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Bald Knob National Wildlife Refuge

Use: Camping and Houseboats

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__X____ **Appropriate**_____

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Bald Knob National Wildlife Refuge

Use: Replacement of Office Trailer and Expansion of Maintenance Shop/Equipment Storage Shed

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

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

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

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

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

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

Not Appropriate_____ **Appropriate**_X__

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Big Lake National Wildlife Refuge

Use: Research and Monitoring

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Big Lake National Wildlife Refuge

Use: Forest Products Harvesting

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Big Lake National Wildlife Refuge

Use: Commercial Guiding for Wildlife Observation and Photography

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Big Lake National Wildlife Refuge

Use: Commercial Video and Photography

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Big Lake National Wildlife Refuge

Use: Nuisance Animal Control

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Big Lake National Wildlife Refuge

Use: Commercial Fishing

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

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

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

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

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

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

Not Appropriate_____ **Appropriate**_X__

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Big Lake National Wildlife Refuge

Use: Camping

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__X____ **Appropriate**_____

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Big Lake National Wildlife Refuge

Use: Replacement of Office/Visitor Contact Station and Maintenance Shop/Equipment Storage Shed

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

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

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

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

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

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

Not Appropriate_____ **Appropriate**_X__

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River National Wildlife Refuge

Use: Research and Monitoring

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River National Wildlife Refuge

Use: Forest Products Harvesting

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River National Wildlife Refuge

Use: Commercial Guiding for Wildlife Observation and Photography

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River National Wildlife Refuge

Use: Commercial Video and Photography

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River 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.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River National Wildlife Refuge

Use: Commercial Fishing

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

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

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

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

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

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

Not Appropriate_____ **Appropriate**_X__

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River National Wildlife Refuge

Use: Nuisance Animal Control

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River National Wildlife Refuge

Use: Furbearer Trapping

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River National Wildlife Refuge

Use: Commercial Guiding for Waterfowl

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__X___ **Appropriate**_____

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River National Wildlife Refuge

Use: Camping and Houseboats

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__X____ **Appropriate**_____

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River National Wildlife Refuge

Use: Construction of Environmental Education/Visitor Center

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wapanocca National Wildlife Refuge

Use: Research and Monitoring

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wapanocca National Wildlife Refuge

Use: Forest Products Harvesting

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wapanocca National Wildlife Refuge

Use: Commercial Guiding for Wildlife Observation and Photography

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wapanocca National Wildlife Refuge

Use: Commercial Video and Photography

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wapanocca 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.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wapanocca National Wildlife Refuge

Use: Nuisance Animal Control

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wapanocca National Wildlife Refuge

Use: Commercial Fishing

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

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

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

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

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

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

Not Appropriate_____ **Appropriate_X__**

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wapanocca National Wildlife Refuge

Use: Camping

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__X____ **Appropriate**_____

Refuge Manager:_____ Date:_____

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

Refuge Supervisor:_____ Date:_____

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wapanocca National Wildlife Refuge

Use: Replacement of Headquarters/Visitor Contact Station

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.

Justifications for Findings of Appropriateness

NOTE: These justification statements apply to the respective Findings of Appropriateness for each refuge where that particular use is proposed.

1. **Research and Monitoring**

Justification: Sound research and monitoring programs provide a better understanding of species, habitats, and the environmental communities present on the refuge. Additional research and monitoring is needed to assess management programs used on the refuge and evaluate alternative options. The benefit of additional knowledge would greatly outweigh any short-term disturbance or loss of individual plants or animals that may occur. This activity would provide guidance to management for fulfilling refuge purposes and meeting established goals and objectives through adaptive management.

2. **Forest Products Harvesting**

Justification: This use would be conducted in accordance with the approved Forest Habitat Management Plan and Annual Habitat Work Plans. This use is a management economic activity that would facilitate the primary purposes of the refuge: to provide waterfowl and migratory habitat, and to conserve other migratory birds and wildlife. This use would meet the mission of the Refuge System by conserving fish, wildlife, and plant resources on these lands, and providing renewable resources for the benefit of the American public. Local economic benefits also would result from this use.

3. **Commercial Guiding for Wildlife Observation and Photography**

Justification: Commercial activities can be allowed on refuges when they do not conflict with the provisions of the Improvement Act and resulting policies and regulations. Special use permit conditions would provide adequate regulation of this specialized activity and quality wildlife observation and photography opportunities for all refuge visitors will be ensured. Commercial guiding for wildlife observation and photography would allow the visiting public additional opportunities to enjoy, experience, and learn about native wildlife and habitats in refuge environments.

4. **Commercial Video and Photography**

Justification: Commercial activities can be allowed on refuges when they do not conflict with the provisions of the Improvement Act and resulting policies and regulations. Commercial video and photography would result in products that may reach groups of people that do not normally know about or visit the refuge, such as elderly, handicapped, or urban youth groups. The services provided by commercial filmmakers would be beneficial to extend public appreciation and understanding of wildlife, natural habitats, and the mission of the Refuge System. Conditions imposed in the special use permit and issued to filmmakers would ensure that these wildlife-dependent activities can occur without adverse effects to refuge resources, or other visitors. The activity would be required to have a primary focus on education and information on refuge purposes and the Refuge System mission.

5. **Cooperative Farming** (Bald Knob/Cache River/Wapanocca NWRs)

Justification: The cooperative farming program is a management economic activity that is needed to provide productive and diverse habitat for wintering waterfowl, migrating shorebirds, wading birds, and other migrating birds in general. Without this program, the refuge could not meet high-priority

management goals and objectives and would not adequately fulfill refuge purposes. The refuge lacks sufficient personnel, funds, and equipment required to farm the needed cropland by force account.

6. **Nuisance Animal Control**

Justification: This use is a management economic activity that would facilitate the primary purpose of the refuge, which is to provide waterfowl habitat and to conserve other migratory birds and wildlife. This use would also meet the mission of the Refuge System by conserving fish, wildlife, and plant resources on these lands, and providing renewable resources for the benefit of the American public. One of the goals of the Refuge System and the refuge is to combat invasive, exotic, and injurious species for the benefit of trust resources. Some local economic benefit also would be derived from this use, which would be conducted under special use permit.

7. **Commercial Fishing** (Big Lake/Cache River/Wapanocca NWRs)

Justification: One of the primary objectives of the Refuge System is to remove exotics from refuges and to restore historic native populations. Removal of exotics and reducing native rough fish populations by commercial harvest is a long-utilized refuge management practice aimed at reducing the competition and adverse impacts to native species. Commercial fishing is a management economic activity utilized by refuge managers as a tool to achieve these objectives while additionally improving aquatic habitat and enhancing fishing opportunities for the enjoyment of the public. The use would be conducted under special use permit.

8. **Furbearer Trapping** (Cache River NWR only)

Justification: This use is a management economic activity that would aid the refuge in protecting valuable wildlife habitat and infrastructure, reducing risk of wildlife disease outbreaks, and reducing predation on trust species, particularly nesting migratory birds. Conducting this use in accordance with state trapping seasons and regulations and further restricting where necessary would ensure that no adverse impacts result from this activity. This use would be conducted under special use permit.

9. **Replacement of Office Trailer and Expansion of Maintenance Shop** (Bald Knob NWR only)

Justification: This project is not a new construction but a replacement of an existing structure utilizing an existing disturbed site. Expansion of the shop would occur on the existing building site. Work activities would have no or negligible environmental effects. This project would be completely funded through ARRA and would enable the refuge to better fulfill refuge purposes by facilitating habitat restoration, management, and conservation programs for trust species. Furthermore, the construction and operation of these facilities would promote compatible public uses, including environmental education and interpretation, that would serve to increase public awareness of the need for and value of Bald Knob NWR and the Refuge System, and garner support for refuge programs.

10. **Replacement of Office/Shop Buildings** (Big Lake and Wapanocca NWRs only)

Justification: This project is not new construction but a replacement of existing facilities utilizing existing disturbed sites. Work activities would have no or negligible environmental effects. This project is completely funded through ARRA and would enable the refuge to better fulfill refuge purposes by facilitating habitat restoration, management, and conservation programs for trust species. Furthermore, the construction and operation of these facilities would promote compatible public uses, including environmental education and interpretation, that would serve to

increase public awareness of the need for and value of the refuge and the Refuge System, and garner support for refuge programs.

11. **Construction of an Environmental Education/Visitor Center** (Cache River NWR only)

Justification: This use would enable the refuge to better achieve refuge purposes, vision, and goals by promoting compatible public uses, especially environmental education and interpretation, which would serve to increase public awareness of the need for and value of Cache River NWR, the Central Arkansas NWR Complex, the Refuge System, and the Service. Such awareness and appreciation by the public would promote support for refuge programs and the mission of the Refuge System and the Service.

The following Findings of Appropriateness were completed prior to the preparation of the CCP and are included herein for reference purposes only.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River NWR

Use: White River & Relief Strs. & Apprs. (AHTD Job # 110123)

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?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(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?	✓	
(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?	✓	

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 ✓ 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** ✓

Refuge Manager: [signature] Date: 03/10/08

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: [signature] Date: 3/15/08

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

FWS Form 3-2319
02/06

White River & Relief Strs. & Apprs. (AHTD Job # 1110123) – Clarendon, AR

The current Highway 79 corridor through White River and Cache River NWRs is functionally obsolete, unsafe, and in need of replacement. Arkansas Highway and Transportation Department (AHTD) will be applying to the Service for a ROW permit (easement) to reposition/realign the existing ROW and replace the existing bridges. No feasible alternative for re-routing the highway exists. Section 106 compliance and an EA/FONSI are complete. The AGFC has been consulted and supports the project. Execution of this use will be in compliance with 50 *CFR* 25, 26, and 29; and 340 *FW* 3 and 603 *FW* 2.

The project will benefit the NWRs because the completed project will result in enhanced wildlife habitats and improved stream flow and overall hydrologic function resulting from habitat and site restoration work that is a stipulation of the project. The NWRs will gain additional property at the project site due to property that will be acquired by AHTD from a private willing seller and deeded to the USA as part of the NWRs. Additionally, the existing ROW running through the NWRs will be abandoned and habitat restoration will be accomplished by AHTD as part of this project. The ownership of the abandoned ROW will convert to the grantor, Monroe County, Arkansas, to then be deeded to the USA as part of the NWRs. Additional property acquired by AHTD that will be necessary to properly effect habitat restoration at the project site will be managed by the Service via a MOA with AHTD. All these actions will ensure no net loss in function or value to the NWRs as a result of this project. Furthermore, public access to the NWRs will be enhanced due to improved highway safety, safer and more functional exits for vehicular access to NWR property, improved visitor parking, safer boat launches, and increased property on which to engage in priority public uses.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River NWR

Use: Bridge Replacement and minor expansion of existing ROW for safety

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?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(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?	✓	
(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?	✓	

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 ✓ 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** ✓

Refuge Manager: Kent M. Wayne Date: 03/03/08

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: Richard P Dugan Date: 3/7/08

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

FWS Form 3-2319
02/06

Appropriateness Justification – Cache River NWR

Bridge replacement and minor expansion of existing ROW for safety – Jackson County Road 51, near Amagon, Arkansas.

Existing wooden bridge spanning the Cache River on Jackson County Road 51 is in a deteriorated condition, constitutes a risk to public safety, and needs to be replaced. The existing roadway embankment floods on a regular basis and serves as a source of undesirable sediment input into the Cache River. Jackson County, Arkansas in conjunction with Arkansas Highway and Transportation Department (AHTD) will be applying for a ROW permit to replace the existing bridge and for minor expansion of existing ROW across Cache River NWR.

The proposed project would resolve critical safety concerns, would improve hydrologic conditions because it will double the elevated portion of roadway and provide more normal stream flows, restore about 0.25 acre of the Cache River floodplain, and divert agricultural runoff from the main channel of the Cache River. Additionally a by-product of the project will be the upgrading of an existing primitive dirt boat ramp at the site to a concrete high-water boat ramp (by the County) that will be used by Refuge visitors to conduct priority public uses. Approximately 1(+) acre of Cache River NWR will be required to accomplish this project. Provision of suitable replacement property would be one stipulation of a Compatibility Determination, the analysis for which will be undertaken should a Concurrence of Appropriateness be attained. The project will not result in increased burden on Refuge financial or staff resources and will be manageable given expected budget and staff levels.

Arkansas Game and Fish Commission has been consulted and has no objections to the project at this time. A clearance by Arkansas has been SHPO obtained by AHTD. The Federal Highway Administration is in the process of preparing a *de minimus* 4 (f) evaluation. Execution of this use will be in compliance with 50 *CFR* 25, 26, and 29; and 340 *FW* 3 and 603 *FW* 2.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cache River NWR

Use: Relocation of 4" gas distribution pipeline under Cache River

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?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(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?	✓	
(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?	✓	

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 ✓ 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** ✓

Refuge Manager: [signature] Date: 10/07/08

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: Richard P Ingram Date: 10/21/08

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

FWS Form 3-2319
02/06

Appropriateness Justification

CenterPoint Energy gas pipeline relocation to accommodate the Arkansas Highway and Transportation Department Jackson County Road 51 bridge replacement near Amagon, Arkansas.

CenterPoint Energy proposes to relocate approximately 850 feet of 4-inch-diameter below ground, plastic natural gas distribution pipeline, which provides services to local residential and commercial clients, to accommodate the Arkansas Highway and Transportation Department's (AHTD) construction of a new bridge over the Cache River located on Jackson County Road 51. The existing bridge is considered functionally obsolete by the AHTD and represents a danger to public safety. CenterPoint Energy's pipeline relocation activities are necessary to accommodate construction of the new bridge. The proposed relocation is necessary because the existing gas pipeline is located where the new bridge's structure footing will be placed.

The existing pipeline will be abandoned in place and new pipe will be installed 24 feet east and installed under the Cache River by using a low-impact pipeline installation technique, the Horizontal Direction Drill (HDD) Method. This installation method minimizes disturbances at the surface and below-ground. The total project ground disturbance will be approximately 0.003 acre. All surface disturbances will be temporary in nature, the temporary workspace areas will be restored to pre-construction conditions, and no permanent surface impacts will occur as a result of the proposed project.

CenterPoint Energy is in the process of applying for a right-of-way permit from the U.S. Fish and Wildlife Service to relocate the existing natural gas distribution pipeline across Cache River NWR. An application fee will be assessed, a Compatibility Determination will be prepared, NEPA compliance will be satisfied, an Intra-Service Section 7 consultation will be conducted, and Arkansas Game and Fish Commission, State Historic Preservation Office, and Native-American tribes will be consulted and provided the opportunity for review and comment. Execution of this use will be in compliance with 50 *CFR* 25, 26, and 29; and 340 *FW* 3 and 603 *FW* 2. The proposed use will not result in increased burden on Refuge financial or staff resources and will be manageable given expected budget and staff levels.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Big Lake NWR

Use: Improvements to Highway 18

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?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(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?	✓	
(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?	✓	

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 ✓ 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** ✓

Refuge Manager: Jeremy Bennett Date: 3/19/09

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: Richard P. Ingram Date: 3/24/09

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

FWS Form 3-2319
02/06

Justification - Appropriateness of the Proposed Improvements to Highway 18

The Arkansas State Highway and Transportation Department (AHTD), in cooperation with the Federal Highway Administration (FHWA), is proposing improvements to approximately 25 miles of Highway 18 between the St. Francis River and Highway 181. The proposed project also involves the approximately one-mile section of Highway 18 that lies within the southern boundary of Big Lake National Wildlife Refuge (Refuge).

The scope of work within the Refuge involves expansion and realignment of the existing ROW, widening the highway from two lanes to four lanes, replacing three two-lane bridges with four-lane bridges across Ditch 81, Big Lake Relief, and the Big Lake Floodway, and upgrading ingress/egress routes to public use areas on the Refuge on the north and south side of the highway.

Highway 18 is a major thoroughfare between Jonesboro and Blytheville. The proposed use of the Refuge is needed to ensure that the highway system will provide safety, continuity, and traffic capacity to meet the needs of future travel demand and economic development in the region. All motorized access to Big Lake NWR originates on Highway 18. The project will enhance safety of Refuge visitors and staff that use Highway 18 to access the Refuge by replacing structurally deficient bridge and roadway structures, improving the substandard roadway to enable safe travel, reducing traffic congestion, increasing sight distances, and improving safety of Refuge ingress/egress.

A study by FHWA and AHTD concluded that no prudent alternative route exists to bypass the Refuge with the improved Highway. The project will result in the conversion of approximately 6.6 acres of Refuge property from a wildlife use to transportation use.

Project planning/design has minimized impacts to Refuge environment, operations, and visitors. Replacement property of sufficient quantity, quality, and location will be purchased by AHTD and transferred in fee title to the USA to be added to the Refuge to ensure no net loss of habitat or function. Any public use facilities will be restored or upgraded. The FHWA is classifying this project as a *de minimus* impact to the Refuge through their Section 4(F) Evaluation. Appropriate ARPA, ESA, NEPA, Tribal Consultation, and Compatibility processes will be undertaken.

Appendix E. Compatibility Determinations

BALD KNOB NATIONAL WILDLIFE REFUGE COMPATIBILITY DETERMINATIONS

Uses: The following uses were found to be appropriate and evaluated to determine their compatibility with the mission of the National Wildlife Refuge System and the purposes of the refuge.

1. Hunting
2. Fishing
3. Wildlife Observation and Photography
4. Environmental Education and Interpretation
5. Research and Monitoring
6. Forest Products Harvesting
7. Commercial Guiding for Wildlife Observation/Photography
8. Commercial Video and Photography
9. Nuisance Animal Control
10. Cooperative Farming
11. Construction of Headquarters/Visitor Contact Station and Expansion of Maintenance Shop

Refuge Name: Bald Knob National Wildlife Refuge.

Date Established: 1993

Establishing and Acquisition Authority(ies):
Emergency Wetlands Resources Act of 1986
Fish and Wildlife Act of 1956
Migratory Bird Conservation Act

Refuge Purpose:

"…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. 3901(b) (Emergency Wetlands Resources Act of 1986)

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

"…for use as an inviolate sanctuary, or for any other management purposes, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act).

National Wildlife Refuge System Mission:

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

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

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)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)
Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
The Property Clause of the U.S. Constitution Article IV 3, Clause 2
The Commerce Clause of the U.S. Constitution Article 1, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System. March 25, 1996
Title 50, Code of Federal Regulations, Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

NOTE: Compatibility determinations for each use listed were considered independently. However, for brevity within this Appendix, the preceding sections from “Uses” through “Other Applicable Laws, Regulations and Policies” and the succeeding sections, “Literature Cited,” “Public Review,” and the “Approval of Compatibility Determinations” are only provided once for each refuge within this Appendix. However, those sections omitted in this CCP remain as part of each compatibility determination and will be included in any compatibility determination that may be printed separately from the CCP.

1) Description of Use: *Hunting*

Hunting opportunities on Bald Knob NWR include the take of squirrel, rabbit, quail, deer, raccoon, opossum, and turkey. Additionally, hunters may take beaver, muskrat, nutria, armadillo, coyote, and feral hog incidental to the hunting of game species listed above. Migratory bird hunting includes waterfowl, doves, snipe, and woodcock. All hunts fall within the framework of the Arkansas Game and Fish Commission (AGFC) open seasons and follow AGFC regulations. There are refuge-specific regulations that supplement and further restrict the AGFC regulations. Refuge-specific regulations are reviewed annually and incorporated into the refuge hunting brochure. All hunters are required to read the refuge brochure and adhere to all regulations contained therein. A hunting permit on the front cover of the brochure must be signed by the hunter and must be carried on his person while hunting on the refuge.

A waterfowl sanctuary established on the south end of the refuge, is closed to all public entry and use (including hunting) from November 15 to February 28. Retriever dogs are allowed for waterfowl hunting and dogs also are allowed for other migratory birds, small game, and raccoon/opossum hunting. Hunter access is by walking, motor vehicle, boat, bicycle, or all-terrain vehicle (ATV). All vehicles, including ATVs and bicycles, may only be used on designated roads, levee tops, and parking areas and are not allowed in fields or other areas. Mobility-impaired hunters may apply for a special use permit allowing specialized access by ATV.

To reduce disturbance to waterfowl in the Farm Unit waterfowl hunt area and adjacent areas of the waterfowl sanctuary, all public use and entry into a specified area (encompassing approximately 2,200 acres in the core of the waterfowl hunt area) will be prohibited after 1:00 p.m. from November 15 through February 28 on a trial basis. Waterfowl response to this practice will be monitored to determine continued necessity and feasibility to ensure compatibility. This regulation does not apply to the Mingo Creek Unit.

Availability of Resources: Adequate resources are available to ensure and administer the proposed activity at its current level of participation. Enforcement of refuge regulations to protect trust resources and provide for a safe, quality recreational opportunity will occur via regular patrols by refuge law enforcement officers. Currently, the refuge has one fulltime officer and one collateral duty officer. Additionally, personnel from the AGFC and White County Sheriff's Department will patrol the refuge and assist refuge officers when needed.

Anticipated Impacts of Use: The incidental taking of other wildlife species, either intentionally or unintentionally, may occur with any consumptive use program. At current and anticipated public use levels for this program, this incidental take would be very small and would not directly or cumulatively impact population levels on the refuge or in the surrounding area. Implementation of a highly effective law enforcement program and continued development of special regulations for this use would eliminate most incidental take, other violations, or safety problems.

Currently, the refuge does not have any known threatened or endangered species. Impacts such as trampling small vertebrates or invertebrates, and crushing/trampling of vegetation would be minimal. Additionally, the activities of hunters traveling to and from hunt areas and their activities while hunting would disturb some non-target wildlife, but these disturbances are temporary, short-term, non-lethal, and not highly repetitive. As a consumptive use, hunting would have some minimal and short-term direct negative impacts on refuge resources. Numbers of resident, as well as migratory, species would be temporarily reduced as animals are harvested, but these individual and collective losses would be compensated by recruitment during the following reproductive season; therefore, no long-term cumulative losses in populations would result.

Determination (check one below):

Use is Not Compatible

X Use is Compatible with the Following Stipulations:

Stipulations Necessary to Ensure Compatibility: Hunting is permitted in accordance with the AGFC regulations and licensing requirements. Additional refuge-specific regulations further restrict the AGFC regulations. The waterfowl sanctuary is closed to all public entry and use, including hunting, from November 15 to February 28. To reduce disturbance to waterfowl in the Farm Unit waterfowl hunt area and adjacent areas of the waterfowl sanctuary, all public use and entry into a specified area (encompassing approximately 2,200 acres in the core of the waterfowl hunt area) will be prohibited after 1:00 p.m. from November 15 through February 28 on a trial basis. Waterfowl response to this practice will be monitored to determine if it will be necessary to continue this restricted access in order to maintain compatibility. This regulation does not apply to the Mingo Creek Unit. All vehicles, including ATVs and bicycles, may only be used on designated roads, parking areas, or levee tops and are not allowed in fields or other areas. Use of ATVs for hunting access will be permitted only from September 1 to February 28. ATV access will be monitored and modified as needed to mitigate any negative impacts to refuge habitats, infrastructure, and visitors in compliance with EO 11644 and EO 11989. Public access to hunt areas may be closed at any time necessary to protect refuge resources or visitors. Possession or use of alcoholic beverages while hunting is prohibited.

Refuge-specific regulations that pertain specifically to waterfowl hunters include but are not limited to:

- Morning hunting (until 12:00 noon) only.
- Shotgun shell possession limit of 25 daily including those located within vehicles.
- Hunting parties must stay a minimum of 100 yards apart.
- Only approved non-toxic shot may be possessed or used.
- Decoys, blinds, boats, and other equipment must be removed daily by 1:00 p.m.
- Cutting of holes or other manipulation of vegetation (i.e., cutting bushes, mowing, weed-eating) or hunting from manipulated areas is prohibited.
- All day hunting permitted for geese (all applicable species) after January closing of the regular duck season through the end of the AGFC conservation season.
- Waterfowl hunters may not enter the refuge earlier than 4:00 a.m. daily.
- Retriever dogs are allowed for waterfowl hunting.
- Commercial waterfowl guiding is not allowed on the refuge.

Refuge-specific regulations that pertain to small game hunting include:

- Spring squirrel season is closed.
- Dogs are allowed for quail hunting.
- Dogs are allowed beginning December 1 for squirrel and rabbit hunting.
- Dogs are required for night hunting of raccoons and opossums.
- Beaver, muskrat, nutria, armadillo, coyote, and feral hog may be taken incidental to any refuge hunt by the use of the device appropriate for that hunt and according to any applicable AGFC regulations.
- The Farm Unit is closed to all other entry and public use (including small game hunting) during the Quota Gun Deer Hunt.
- Only approved non-toxic shot or rimfire rifles may be possessed and used for all small game hunting.

Refuge-specific regulations that pertain to big game hunting include:

- Harvested deer and turkey taken must be recorded at one of the two self-check stations located on the refuge. During the Quota Gun Deer Hunt, all harvested deer must be checked at a manned check station on the refuge.
- Only portable stands capable of being carried by one person may be used and the owner's name and address must be permanently affixed to the stand.
- Stands may be erected 7 days prior to the refuge deer season and must be removed from the waterfowl sanctuary prior to November 15 and from the rest of the refuge by the last day of archery season.
- For all refuge hunts, the limit is one either-sex deer per hunt except for the archery season in which the statewide bag limit applies.
- Driving or screwing any metal object into a tree or hunting from a tree in which a metal object has been driven or screwed to support a hunter is prohibited.
- Building or hunting from permanent blinds or stands is prohibited.
- Hunting from a vehicle or use of a vehicle as a deer stand is prohibited.
- Baiting or hunting over bait, salt, grain, or other feed that could serves as a lure or attractant for wildlife is prohibited.
- Hunting from mowed or maintained roads is prohibited.
- Only shotguns with slugs, legal pistols, and muzzleloaders, shooting a single projectile, may be used or possessed during the Quota Gun Deer Hunt.
- Possession or use of buckshot is prohibited.
- The Mingo Creek Unit is closed to the Quota Gun Deer Hunt.
- The refuge is closed to all other public entry and use (including deer archery hunting) during the Quota Gun Deer Hunt.
- Turkey hunting is restricted to fall archery only and is permitted only on the Mingo Creek Unit.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, hunting is a priority public use activity that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

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

_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

2) Description of Use: *Fishing*

Fishing and frogging are the most common public uses on Bald Knob National Wildlife Refuge. Bald Knob NWR contains over 100 miles of ditches, 14 miles of irrigation canals, and over 200 acres of sloughs and oxbow lakes. The refuge experiences various degrees of flooding from the White and Little Red River Systems that keep permanent water sources restocked with fish. Fishing is permitted year-round and anglers find plenty of opportunities to fish on the cypress/tupelo brakes,

ditches, and canals scattered throughout the refuge. There are 6 boat ramps which allow access to sloughs, creeks, and the Little Red River.

Fish creel and frog limits, boating safety, and license requirements are in accordance with the Arkansas Game and Fish Commission (AGFC) regulations. Fishing with rod and reel, pole and line, limb line, yo-yo, jug line, trotline, and bow and arrow (on line) is permitted. Fishermen are also permitted to collect crawfish with rakes and/or traps for personal use only. Commercial fishing and the harvesting of turtles and mussels is prohibited. A waterfowl sanctuary, established on the south end of the refuge, is closed to all public entry and use (including fishing) from November 15 to February 28. Access to fishing areas is by motor vehicle, boat, or walking. Vehicles may only be used on designated roads, parking areas, levee tops, and are not allowed in fields or other areas. All-terrain vehicles (ATVs) are not allowed for this use.

Availability of Resources: Refuge staff and resources are adequate to cover management of fishing at current levels. However, it is anticipated that an increase in this use may occur over the coming years. In order to provide safe and quality fishing, additional resources and staff will be needed to enhance or develop additional access areas and provide law enforcement. A portion of the refuge's budget is spent annually managing for the benefit of freshwater fisheries, maintaining boat launching ramps, improving access, conducting law enforcement patrols, and ensuring refuge visitors are in accordance with boater safety and following refuge regulations.

Anticipated Impacts of the Use: Fishing and frogging should not adversely affect the fisheries resource, wildlife resource, or any other natural resource of the refuge. Monitoring of frogs will be implemented to gauge trends in numbers and habitat use. The activities associated with fishing and frogging, including travel to and from fishing areas, may cause trampling of vegetation, small invertebrates, and vertebrates; however, these are short-term, relatively minor, and not highly repetitive. Most of the trampling occurs along road shoulders and along ditch banks where bushhogging takes place to control woody vegetation. A known heron/egret rookery occurs in Hackelton Lake on the Mingo Creek Unit, but any disturbances associated with fishing have not caused any apparent negative impacts. A Bald Eagle pair has successfully nested for 9 years over the Eagle Nest Brake, which is a favorite fishing area on the south end of the Farm Unit, apparently without any negative impacts.

Fishing is a wholesome, enjoyable, and wildlife-dependent public use opportunity; however, participation in this activity generally results in litter on the refuge (fishing line, food, bait containers, soda/beer cans, and other "trash") that must be removed numerous times per year in order to keep the refuge looking presentable. Trash is detrimental to the aesthetics of the refuge and can impact the digestive tracts of birds, turtles, fish, and other resident and migratory wildlife. The refuge would strive to reduce this problem by working with partners to pick up litter, educating anglers not to litter, and law enforcement. Information contained in the refuge brochure concerning rules and regulations also helps keep negative impacts to a minimum. Regulations are reviewed annually and modifications are made as necessary to maintain compatibility and ensure a safe and quality fishing program.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Fishing and frogging are permitted in accordance with AGFC regulations and licensing requirements. Conflicts between anglers and hunters or other visitors using the refuge for non-consumptive wildlife recreation have not been a problem and are not expected to be a problem in the future. Associated violations, such as taking under-sized fish, open fires, and littering can be minimized by public outreach and a continued law enforcement presence.

The following refuge-specific regulations help ensure the refuge fishing program is compatible with refuge purposes:

- All fishing tackle must be attended at all times.
- Crawfish may be collected for personal use only. All crawfish traps must have the owner's name and address permanently affixed.
- Taking or possessing turtles and mussels is prohibited.
- Commercial fishing is prohibited.
- Waterfowl sanctuaries are closed to all public entry and use (including fishing and frogging) from November 15-February 28.
- The refuge is closed to all other entry and public use (including fishing and frogging) during the Quota Gun Deer Hunt.
- Personal watercraft (e.g., jet-skis, hover craft, and airboats) are prohibited.
- All-terrain vehicles (ATVs) are not allowed for this use.
- Vehicles may only be used on designated roads or parking areas to provide access for fishing.
- Public access to fishing areas may be closed at any time necessary to protect refuge resources or visitor safety.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, fishing is a priority public use activity that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

3) Description of Use: *Wildlife Observation and Photography*

Wildlife observation and photography are important public uses at Bald Knob NWR. Abundant wildlife and convenient access make the refuge a destination for visitors hoping to observe and photograph a variety of wildlife and their habitats. Visitors are especially interested in viewing and photographing waterfowl; shorebirds; other migratory birds, including Bald Eagles; and resident wildlife, such as white-tailed deer, Eastern Wild Turkey, turtles, and raccoons. There are no developed facilities for this use, such as photo blinds or observation platforms, although these facilities are being planned. Access is by vehicle, boat, or walking. All-terrain vehicles (ATVs) are not allowed for this use. All vehicle use is restricted to designated roads, parking areas, and levee tops only, and is not allowed in fields or other areas.

Availability of Resources: Refuge staff and resources are adequate to administer the program at current levels. However, it is anticipated that an increase in these uses will occur over the coming years. In order to provide safe and quality wildlife observation and photography opportunities, additional resources and staff will be needed to enhance or develop additional viewing areas and provide improved facilities and programs.

Anticipated Impacts of Use: The activities of visitors engaging in wildlife observation and photography may result in some potential disturbance to wildlife. Minimal impacts in the form of trampling small vertebrates or invertebrates and vegetation and littering may also occur. Significant indirect or cumulative adverse impacts to refuge resources are not expected from these activities. The establishment of specified viewing areas and facilities, such as blinds, boardwalks, platforms, towers, and trails, would enhance observation and photography, as well as minimize associated visitor impacts or conflicts with other uses. Plans to provide such facilities are in progress.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Public access for specified wildlife observation and photography would be allowed in designated areas only. The waterfowl sanctuary will be seasonally (November 15-February 28) closed to all public entry and use. During the Quota Gun Deer Hunt, the refuge is closed to all public entry and use (including wildlife observation and photography) except by Quota Gun Deer Hunt permit holders. Regulations governing public use are reviewed annually and any necessary modifications are made to ensure refuge resources are protected and visitors can enjoy a safe and quality experience. Wildlife observation and photography uses will be monitored and appropriate management action will be taken to eliminate or reduce associated impacts. Public access to wildlife observation and photography areas or facilities may be closed at any time necessary to ensure protection of refuge resources and visitor safety. All vehicle use is restricted to designated roads, levee tops, and parking areas only.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, wildlife observation and photography are priority public use activities that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
__X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

4) Description of Use: *Environmental Education and Interpretation*

On Bald Knob NWR, environmental education and interpretation activities are conducted to inform and educate the public and provide an understanding of natural resource values and refuge purposes and the mission of the National Wildlife Refuge System. The environmental education and interpretation program facilities will include visitor contact areas, kiosks, platforms or towers, routes or trails, and other designated public use facilities or access areas. In addition, refuge staff provide off-site environmental education and interpretation services at local events such as festivals, fishing derbies, school classes, and civic or conservation group meetings. Access is by vehicle, boat, or walking. All vehicles may only be used on designated roads, parking areas, or levee tops and are not allowed in fields or other areas.

Availability of Resources: Refuge staff and resources are adequate to administer the program at current levels. However, it is anticipated that an increase in these uses will occur over the coming years. In order to provide safe and quality environmental education and interpretation opportunities, additional resources and staff will be needed to develop or provide enhanced programs and interpretive facilities (such as visitor contact stations, observation platforms, interpretive trails, kiosks, and other facilities). Plans are being developed to provide additional or improved facilities as described herein. Additionally, the utilization and development (training) of volunteers may supplement environmental education and interpretation programs.

Anticipated Impacts of Use: Outdoor environmental education and interpretation activities may result in minimal disturbance to wildlife from visitors. It is possible that some small vertebrates, invertebrates, and vegetation could be trampled. Littering may also occur. Significant indirect or direct cumulative adverse impacts to refuge resources are not expected from these activities. Environmental education and interpretation facilities, such as blinds, boardwalks, exhibits, kiosks, platforms, and towers, will be designed and established as feasible to minimize potential disturbance to wildlife and impacts to resources.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Environmental education and interpretation activities conducted outdoors should be strategically located to minimize impacts and may need to be rotated or moved periodically. The waterfowl sanctuary will be seasonally (November 15-February 28) closed to all public entry and use. Public access to the refuge may be closed at any time necessary to ensure protection of refuge resources and visitor safety. The refuge is closed to all public entry and use (including environmental education and interpretation) during Quota Gun Deer Hunt, except for Quota Gun Deer Hunt permit holders. Regulations concerning public use are reviewed annually and any necessary modifications are incorporated into refuge brochures or otherwise conveyed to visitors. Environmental education and outreach can be taken into the classroom, incorporated into presentations, and will be used at other forums; these activities will have no deleterious affect on fish and wildlife at the refuge.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, environmental education and interpretation are priority public use activities that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
__X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

5) Description of Use: *Research and Monitoring*
Bald Knob NWR would allow university students and professors, as well as governmental or non-governmental employees and volunteers, to conduct short or long-term research and monitoring studies. Such research and monitoring would be conducted in various habitats throughout the refuge and with various species of migratory birds, resident wildlife, and fish. The information collected would provide a better understanding of ecosystem functions and responses to management actions. Research and monitoring results would help managers to evaluate prior management actions, identify adaptive management options, and develop "Best Management Practices" (BMPs). The knowledge gained through research and monitoring studies would allow more effective management decisions. All research and monitoring project requests would be evaluated on individual project merit and applicability to refuge programs on a project-by-project basis.

Availability of Resources: Resources are adequate to administer research and monitoring activity at the current level. The refuge will also seek to establish and/or expand partnerships for continued research and monitoring projects conducted by other organizations on refuge lands.

Anticipated Impacts of Use: There could be some negative impacts from scientific research and monitoring on the refuge. Impacts such as trampling vegetation, ATV and motor boat use, and temporary disturbance to wildlife would occur. A small number of individual plants or animals may be collected for further study. These collections would not likely adversely affect refuge plant and animal populations. Removal of plant and animal material from the refuge, as well as the potential to accidentally introduce exotic plants and animals, must be carefully monitored and controlled. Some other impacts from research include: (1) Noise disturbance from helicopter, airplane, motor boat, airboat, truck, car, or ATV that may temporarily disturb and/or displace wildlife; (2) physical presence of people or equipment that may temporarily disturb and/or displace wildlife; (3) ground disturbance from walking on site or the use of equipment; and (4) water disturbance by stirring sediments and causing temporary turbidity from equipment or walking. The federally endangered fat pocketbook mussel occurs in an isolated portion of the refuge; this use will not negatively impact this species. Despite these impacts, which are short-term, the knowledge gained from carefully considered and properly executed scientifically defensible research and monitoring would provide information and justification to improve management techniques and better meet the needs of trust species. Research/monitoring activities on the refuge are not expected to indirectly or cumulatively impact refuge resources negatively, even though some minimal short-term and direct impacts may occur.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: All researchers would be required to obtain and possess a refuge special use permit. Individual requests to use specialized equipment, all-terrain vehicles, etc., would be evaluated on a project-by-project basis and specified on each special use permit. Researchers would periodically be evaluated for compliance with requirements. Periodic progress reports would be required and final copies of all reports and publications would be provided to the refuge. The refuge would not directly supply personnel or equipment unless arrangements were made prior to issuance of the special use permit. The refuge manager would reserve the right to delegate a staff member to accompany permitee(s) at any time. All plants or animals sampled, collected, or released would be done in a scientifically accepted manner, such as those specified by scientific societies. Examples of these societies include the Society for the Study of Amphibians and Reptiles, the American Society of Mammologists, the American Ornithological Society, the Ichthyologists League, the Entomological Society of America, and the Botanical Society of America. Incidental take and

inadvertent trampling of vegetation or wildlife are expected to be minimal and will be addressed with each permit request. Given compliance with the restrictions set in each special use permit, research and monitoring conducted on the refuge is considered to be compatible with the purposes for which the refuge was established.

Justification: Sound research and monitoring programs provide a better understanding of species, habitats, and the environmental communities present on the refuge. Additional research and monitoring is needed to assess management programs used on the refuge and to evaluate alternative options. The benefit of additional knowledge will greatly outweigh any temporary or short-term disturbance or loss of individual plants or animals that may occur. This activity will provide guidance to management for fulfilling refuge purposes and meeting established goals and objectives through adaptive management.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

6) Description of Use: *Forest Products Harvesting*

Conduct a comprehensive forest management program on Bald Knob NWR in accordance with an approved forest management plan. Refuge forest habitats will be evaluated over a 3-year cycle. Prescriptions detailing needed actions will be developed, approved from the Service's Regional Office, and carried out on a yearly basis. It is proposed that select trees be sold, and then removed by commercial operations. The forest habitat may also be manipulated by permitees/staff when commercial sales are not feasible. Only trees needing to be removed in order to improve the forest habitat for wildlife or to restore the integrity of the forested wetlands ecosystem will be taken or manipulated. Special use permits may be issued for firewood cutting (personal use) when there is excess downed wood from silvicultural operations or when roads are widened. Seasonal special use permits may be issued for gathering seed, on a limited basis, when forest seed crops are abundant.

Operations may be conducted throughout the year, but only according to the guidelines detailed in the Forest Habitat Management Plan. Operations may involve numerous individuals using hand tools such as chain saws and heavy equipment such as feller-bunchers, skidders, bulldozers, and log trucks.

Availability of Resources: Some elements of needed resources are already in place, such as the forester's time and salary, and the small amount of time needed by other positions in maintenance, law enforcement, management, and administration. Additional expenses for equipment maintenance, operating expenses, and habitat restoration can be funded out of the refuge's budget. The Forest Habitat Management Plan allows that management will be carried out to the extent of available resources (see Section 3.2; Physical Plant and Equipment Use Requirements for a more detailed description).

Anticipated Impacts of the Use: Timber harvest operations will result in short-term disturbances and long-term benefits to forest habitats. Short-term impacts will include disturbance and displacement of wildlife, vegetation, and soils typical of any heavy equipment operation. Operation of heavy equipment and removal of some vegetation will also result in a short-term increase in soil erosion. Additionally,

wildlife species dependent on undisturbed forest habitat will be temporarily displaced. As vegetation is disturbed, other wildlife species may also be temporarily displaced. Over time, these short-term impacts will wane as the effects of improvement treatments develop and the benefits are realized. The refuge is divided into 6 forest compartments; therefore, short-term impacts will be minimized by implementing the proposed actions in only a small percentage of the refuge at any given time.

Firewood cutting and forest seed collection will result in only temporary disturbances. Seeds are gathered by hand and sold to local nurseries that, in turn, grow seedlings. The refuge has a need for seedlings to restore marginal cropland and other open fields. By allowing a limited forest seed harvest, the refuge is ensuring a continued supply of suitable seedlings of local origin for forest restoration. In the past, participation in refuge firewood cutting and hand collecting of forest seeds has been low, and future participation is also expected to be low. The quantity and frequency of firewood cutting and seed harvesting is not expected to result in significant disturbance, diminish wildlife food resources, or jeopardize wildlife survival. Short-term disturbance to wildlife may occur during these activities, but will be insignificant because of the small scale of the projects. Most of the use will occur in late summer or fall, after ground nesting birds have completed the nesting season. Firewood cutting or seed collection should not result in short- or long-term impacts that adversely affect the purpose of the refuge or the mission of the National Wildlife Refuge System.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:
See General and Specific Guidelines in the Forest Habitat Management Plan, Appendix 7.10 and 7.11.

7.10 General Conditions Applicable To Timber Harvesting Permits

Subcontractors: Subcontractors or agents may be employed with authorization from the refuge forester.

Safety Requirements: The contractor must perform this contract in a safe manner, observing any necessary safety precautions. The contractor will promptly correct any condition, which, in the opinion of the refuge manager or his authorized representative, endangers the safety of personnel, the public, and/or property during the performance of this contract. Failure to observe this requirement will result in contract termination, with the contractor liable for any such damages that may occur.

Liabilities of the Contractor: The contractor will hold the government and all its representatives harmless from all suits, actions, or claims of any character arising out of the injuries to any person or damage to any property resulting from any neglect in the performance of the services required by this contract, or from any claims arising or recovered under the Workman's Compensation laws or any other law, by law, ordinance, order or decree, or on account of any other act or omission by the contractor or his employees while carrying on operations under this contract. This responsibility will terminate when suits, actions, or claims have been satisfied.

Insurance Coverage: The contractor must be covered by adequate insurance, as the government will assume no liability whatsoever as a result of the contractor's operations under this contract.

Inspection of Work Site: Before submitting a bid, prospective bidders are urged to personally inspect the site. Arrangements to view may be made by contacting Cache River National Wildlife Refuge, Augusta, Arkansas. Telephone (870) 347-2614.

7.11 Special Conditions Applicable To Timber Harvesting Permits

- A pre-entry conference between the refuge forester and the designated permitee representative will be required before the permitee starts logging operations. The purpose of the pre-entry conference is to be sure that the permitee completely understands what is expected and thus minimizes conflicts.
- All refuge wildlife is protected. All reasonable efforts will be made by the permitee to protect wildlife from harm and harassment.
- All logging will be within the boundaries specified on the attached map.
- Trees will be cut so as to leave ground-level paint spots visible after the tree has been cut. All marked trees are to be cut, with the exception of marked leave trees in shelterwood, seed tree, or small open areas as described in the special use permit.
- Only marked or designated trees will be cut. Care will be taken to protect all other trees and vegetation from damage. Unmarked trees that are cut or injured through carelessness will result in a fine of $5 per inch diameter at stump height or breast height if present.
- Trees and tops will not be left hanging or supported by any other tree and will be laid down immediately after felling.
- Tops and logging debris will be lopped to within 6 feet of the ground in all areas 100 feet or less from major roads.
- All roads, rights-of-way, active agricultural fields, designated openings, ditches, and streams must be kept clear of tops and debris. The permitee is required to repair all damage resulting from operations conducted under this permit.
- The skidding of logs greater than 20 feet in length may be prohibited in designated areas.
- The refuge manager or his authorized representative must approve the location of additional roads. Additional trees removed for roads or loading sites will be marked by the refuge forester and paid for at bid price.
- Loading of forest products on public roads or shoulders, or regeneration areas is prohibited.
- Logging will not be permitted when the ground is wet and subject to rutting and severe compaction. The permitee and his employees will do all in their power to prevent rutting and erosion.
- The permitee and his employees will do all within their power to prevent and suppress forest fires. Fires will be reported immediately to the refuge office.
- Ownership of all products remaining on a sale area will revert back to the government upon termination of the permit.
- Littering in any manner is a violation of the Code of Federal Regulations. The entire work area will be kept free of all litter at all times.
- The possession or use of firearms of other weapons on the refuge is prohibited outside of hunting seasons.
- The government accepts no responsibility to provide right-of-way over private lands for materials sold under this contract.
- The refuge manager or his authorized representative will have the authority to temporarily close down all or any part of the operation during a period of high fire danger, wet ground conditions, or for any other reason deemed necessary. Additional time, equal to the closing period, will be granted to the permitee.

- The decision of the refuge manager will be final in the interpretation of the regulations and provisions governing the sale, cutting, and removal of the timber products covered by this permit.

Justification: This use has been determined compatible provided the above stipulations are implemented. This use will facilitate the primary purpose of the refuge, which is to provide waterfowl habitat and to conserve other migratory birds and wildlife. This use will meet the mission of the National Wildlife Refuge System and enhances fish, wildlife, and plant resources on these lands by providing renewable resources for the benefit of the American public. This use will be administered in compliance with 50 CFR 29.1.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

7) Description of Use: *Commercial Guiding for Wildlife Observation/Photography*

Allow commercial guiding to facilitate Wildlife Observation/Photography on Bald Knob NWR. The objective is to provide the opportunity to experience wildlife observation and photography to the segment of the public lacking the knowledge or equipment required to view/photograph fish, wildlife, plants, or their habitats in compliance with the legal mandates of the National Wildlife Refuge System Improvement Act of 1997. The surrounding communities, including Bald Knob, Searcy, and Augusta, are dependent on supporting refuge visitors throughout the year. Within these communities, grocery stores, sporting goods stores, restaurants, lodges, and other businesses obtain a large proportion of their annual income from the influx of refuge visitors. Although wildlife observation and photography is involved on guided trips, the commercial nature of guiding activities associated with this use does not qualify as one of the six priority public uses (Federal Register/Vol.65, No.202/Wednesday, October 18, 2000/Rules and Regulations-Issue 13: Priority Uses, Pages 62471 and 62472). All commercial activities, including guiding of wildlife observers and photographers, are special type uses that may be authorized when they are appropriate and compatible with the purpose of the refuge, the mission of the National Wildlife Refuge System, and can be administered in a way that minimizes conflicts with priority uses and does not hinder the activities of visiting public not using guide services.

Guiding and equipment may involve the use of vehicles, buses, motor boats, paddle boats, canoes, and hiking. Guiding will be allowed only in designated areas and according to conditions specified by the refuge manager. Several miles of refuge roads are also used to access remote sloughs, bayous, and lakes where wildlife observers and photographers may conduct their activities.

Guides will be allowed to operate through issuance of a special use permit, which must be renewed annually. Special conditions are attached and part of the special use permit designed to meet the above objectives and provide liability protection to the government. The annual fee for the special use permit will be $500.

Increased requests for special use permits to conduct wildlife observation and photography guiding on Bald Knob NWR are expected in the future. Special use permits will be issued on a first-come, first-serve basis. The refuge reserves the option to limit the number of permits issued as necessary to ensure compatibility. Future increased requests for commercial wildlife observation and photography guiding special use permits will be reviewed by management and additional steps, including limiting the number of guides, increasing annual permit fees, designating observation areas, or discontinuing this use entirely, as may be necessary to maintain safe and quality wildlife observation and photography opportunities for all refuge visitors.

Availability of Resources: Adequate funding and staff exist to administer refuge regulations and special use permit conditions at the current level of interest for this activity. An increase in permit issuance may not be possible with the current existing staff. Any increase will be reviewed by management to ensure compatibility.

Anticipated Impacts of the Use: Commercial guiding for wildlife observation/photography would increase opportunities for the public to experience wildlife and gain an added appreciation for the value of Bald Knob NWR and the National Wildlife Refuge System. This use would benefit a diverse set of participants from within and outside this local area. The use also would allow some economic benefit to local communities from refuge visitation. Minor impacts, such as short-term and temporary wildlife disturbance, could result. In addition, there could be minor trampling of vegetation and small vertebrates and invertebrates. These impacts are not expected to be significant.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: A special use permit is required.

- No special privileges are granted to the permitee other than those stated in the permit. Interfering with any other individual lawfully participating in any authorized activity on the refuge will be grounds for immediate revocation of the permit and for possible legal prosecution.
- The permitee and assistant each must comply with all applicable federal, state, and refuge laws, regulations, and policy.
- A copy of the permit must be in the possession of the permitee and assistant while engaged in commercial guiding activities.
- Guided parties are limited to fifteen (15) members and the permitee and his assistant who must all stay together as one (1) party on the refuge. Only one (1) party may be guided per day. The permitee must accompany all parties. Any exception to this requirement must be applied for and approved by the refuge manager prior to such event.
- Within one (1) week after the end of the calendar year, the permitee must furnish the refuge manager with a written report on the number of individuals taken onto the refuge and fees charged.
- The permit may be terminated or revoked at any time without refund to the permitee for non-compliance with any of the terms thereof. Any violation may be grounds for future permit denial.
- The permitee and his/her agents and guests shall save, hold harmless, defend, and indemnify the United States of America, its agents, and employees for loss, damages, or judgments and expenses on account of bodily injury, death or property damage, or claims for bodily injury, death, or property damage of any nature whatsoever, and by whomever made, arising out of the permitees, his/her employees, subcontractors, or agents with respect to conducting activities connected with the permit within the lands administered by Bald Knob NWR.

- Permitee must provide proof of liability insurance ($300,000 each occurrence, $500,000 aggregate) with the U.S. Fish and Wildlife Service named as co-insured prior to issuance of the special use permit.
- All equipment must be removed from the refuge daily.
- The refuge may limit the number of special use permits issued or discontinue this use entirely in order to ensure appropriateness, compatibility, and safe, quality opportunities for visitors not using guide services.

Justification: Commercial activities can be allowed on refuges when they do not conflict with the provisions of the National Wildlife Refuge System Improvement Act of 1997 and resulting policies and regulations. The special use permit conditions provide adequate regulation of this specialized activity and quality wildlife observation and photography opportunities for all refuge visitors will be ensured. Commercially guided wildlife observation and photography is a public use that will allow the unskilled or inexperienced participants to enjoy, experience, and learn about native wildlife and habitats in this bottomland hardwood environment. This commercial wildlife observation/photography use is being implemented in compliance with the legal mandates of the National Wildlife Refuge System Improvement Act, including compatibility.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-Year Re-evaluation Date:

8) Description of Use: *Commercial Video and Photography*

Allow commercial video and photography activities on Bald Knob NWR for the purpose of exposing the public to the Refuge and to promote recognition of the diverse wildlife and habitats found there. Over the past several years, Bald Knob NWR has been contacted as to the possibility of producing commercial audio-visual productions such as video and still photographs. The refuge provides a variety of natural habitats abundant with wildlife and is an ideal setting for filmmakers. As central Arkansas and Service programs for visitors are promoted, demand for commercial filming on the refuge may increase.

Availability of Resources: Adequate refuge staff and resources are available to administer this activity at the current level.

Anticipated Impacts of Use: Commercially produced video and photography could result in some disturbance to wildlife. Some minimal trampling of vegetation, invertebrates, and small vertebrates may also occur. However, it is anticipated that this disturbance would be minimal, short-term, localized, and not highly repetitive. Commercially produced video and photography activities are not expected to indirectly or cumulatively impact refuge resources negatively.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Access for commercially produced video and photography activities would be allowed in designated areas only under special use permit. Activities would be monitored to document any negative impacts to wildlife; if negative impacts are found, corrective action would be taken to reduce or eliminate these impacts. Access to key observation and photography areas may be closed during adverse weather conditions for protection of infrastructure (roads, levees, etc.), and visitor safety.

Public Law 106-206, signed by the President on May 26, 2000, directed the Secretary of the Interior to require a special use permit and establish a reasonable fee for commercial filming activities on federal lands administered by the Secretary. This law further stated that for still photography neither a special use permit nor a fee would be assessed if the activities take place on lands where members of the public are generally allowed. The Secretary may require a special use permit and fee if photographic activities take place at locations where the general public is not allowed or where additional administrative costs are likely.

The Secretary shall not permit any filming, still photography, or other related activity if the Secretary determines:

1. There is a likelihood of resource damage;
2. There would be an unreasonable disruption of the public's use and enjoyment of the site; or
3. That the activity poses health or safety risks to the public.

Further guidance is found in 43 CFR 5.1 and 50 CFR 27.71, which regulate the making of pictures, television productions, or sound tracks on national wildlife refuges.

- A special use permit is required of any party except amateur photographers or bona fide newsreel and news television photographers and soundmen. All other parties must obtain written permission from local officials having administrative responsibility for the area involved.
- However, the Secretary has determined that no fee will be charged for the making of such motion pictures, television productions, or sound tracks on areas administered by the U.S. Fish and Wildlife Service (Note: this provision is currently under Departmental review).
- A bond shall be furnished, or deposit made in cash or by certified check, in an amount to be set by the official in charge of the area to ensure full compliance with all conditions prescribed in the permit. Such bond may be refunded to the applicant if all permit requirements are met and no costs to the government are incurred.
- Permission to make a motion picture, television production, or sound track will be granted by the head of the Service or his/her authorized representative at his/her discretion and on acceptance by the applicant of conditions set forth in a special use permit. Applicants must describe the area where filming is requested and the scope of the filming or production or recording. Dependent upon weather conditions, applicants will state when filming or other production will begin and end.

Other stipulations include:

- Utmost care will be exercised to see that no natural features are injured, and after completion of the work, the area will, as required by the refuge manager, either be cleaned up and restored to its prior condition or left, after cleanup, in a condition satisfactory to the refuge manager.

- Credit will be given to the Department of the Interior and the U.S. Fish and Wildlife Service through the use of an appropriate title or announcement, unless the refuge manager issues a written statement that no such courtesy credit is desired. A copy of the final product will be provided pro bono to the refuge staff.
- Pictures will be taken of wildlife only when such wildlife will be shown in its natural state or under approved management conditions, if such wildlife is confined.
- Any special instructions received from refuge manager will be complied with.
- Any additional information relating to the privilege applied for by the applicant will be furnished upon request.
- Other stipulations may be warranted depending upon the proposed location and season of the year the activity is conducted.

Further guidance on this activity is found in the Service Manual 650 FW 5.

The following stipulations apply to special use permits issued for commercially produced video and photography activities. To minimize impacts on refuge lands and resources, the refuge manager will ensure that filmmakers comply with policies, rules, and regulations, and will monitor and assess all activities of filmmakers.

- Failure to abide by any part of a special use permit: violation of any refuge-related provision in Titles 43 or 50, Code of Federal Regulations; or any pertinent state regulation (e.g., fish or game violation) will be considered grounds for immediate revocation of the permit and could result in denial of future permit requests for lands administered by the U.S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit.
- The permitee is responsible for ensuring that all employees, party members, and any other persons working for the permitee and conducting activities allowed by the special use permit are familiar with and adhere to the conditions of the permit.
- The special use permit may be canceled or revised at any time by the refuge manager for noncompliance or in case of emergency (e.g., public safety, unusual resource problems). The permitee and permitee's clients do not have exclusive use of this site(s) or lands covered by the permit.
- Prior to beginning any activities allowed by the special use permit, the permitee shall provide the refuge with: (1) Copy of current business license; and (2) proof of comprehensive general liability insurance.
- Prior to conducting commercial filming activities, the permitee shall provide the refuge manager with the name and method of contact for the field party chief or supervisor.
- A valid copy of the special use permit, signed by the refuge manager or designee, must be in the party leader's possession at all times while exercising the privileges of the permit.
- Endorsement of the special use permit signifies the permitee's understanding and concurrence with all the conditions set forth in the General Conditions found on the reverse side of the permit and the above Special Conditions.

Under the stipulations described above, commercially produced filmmaking, production, or sound track recording is viewed as compatible with the purposes for which the refuge was established.

Justification: Commercial video and photography are economic uses that must contribute to the achievement of refuge purposes or the mission of the National Wildlife Refuge System. The products derived may educate groups of people that may not normally know about the refuge, such as the elderly, handicapped, or urban youth groups. The services provided by commercial filmmakers will be beneficial to extend public appreciation and understanding of wildlife, natural habitats, and the mission of the Refuge System. Conditions imposed in the permit of filmmakers ensure that these

wildlife-dependent activities can occur without adverse effects to refuge resources or other visitors. The activity will be required to have a primary focus on education and information about refuge purposes and the Refuge System mission.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

9) Description of Use: *Nuisance Animal Control*

This activity would allow a managed and highly targeted program for the take of nuisance animals on Bald Knob NWR that are harmful to refuge habitat and/or infrastructure critical to refuge habitat management and operations, and therefore a threat to the trust species that inhabit or utilize the refuge. Currently this program will specifically address beaver, nutria, and feral hogs, but may be expanded to other species if necessary and in compliance with Arkansas Game and Fish Commission (AGFC) regulations, to address future harmful impacts caused by exotic or invasive species and prevent or control problems, such as disease outbreaks involving furbearers or excessive predation on trust species.

Semi-aquatic Component
The hydrology and habitat of the refuge is such that semi-aquatic animals, specifically, beaver (*Castor Canadensis*) and nutria (*Myocastor coypus*), have become prolific and their dense populations have degraded habitat for other wildlife usage. Beaver naturally impound water to enhance accessibility and extend usable habitat beyond the stream channel. Under normal hydrologic and population conditions, beavers are held in check by availability of water and natural predators, and under these conditions their impoundments may provide beneficial aquatic microhabitats containing scrub-shrub vegetation and trees. However, the amount of irrigated cropland on the refuge provides beavers with a “dry” season water supply from irrigation runoff. Beaver and nutria have little pressure from natural predators. Beaver populations have grown to the point that impoundments have been rebuilt for many years and impounded areas have grown in size. Over the long-term, these impoundments degrade the habitat both within and surrounding the area because the woody vegetation within the impoundments decreases in diversity and abundance, and trees eventually will be excluded altogether. The water table surrounding the impoundment is elevated, altering the forest species composition and degrading quality and health. The hydrology itself is impacted as sediment and organic material from decomposing aquatic vegetation accumulates in the impoundment and impedes the ability of the site to dewater. Additionally, water quality in impounded areas is negatively affected due to increased water temperature and turbidity, decreased dissolved oxygen, and reduced species diversity.

Nutria are non-native herbivores that cause negative impacts on wildlife habitat by consuming and destroying aquatic vegetation, and burrowing in levees of migratory bird impoundments. Their constant burrowing causes roads and levees to collapse, which ultimately poses major safety issues for refuge personnel and visitors. These activities degrade habitat managed for waterfowl, shorebirds, and other desired species. Their foraging activities also result in competition with waterfowl for food resources.

Refuge staff remove beaver impoundments annually and opportunistically, and conduct wintertime trapping and shooting, but do not have resources to consistently and effectively pursue sufficient control to protect the habitat resources from beaver and nutria impacts.

Terrestrial Component
The presence of feral hogs (*Sus scrofa*) has been documented on the refuge and observed on several occasions in the recent past. The animals are not native and have few natural predators. The hogs compete with resident wildlife for forage, which includes herbaceous vegetation, roots, acorns, invertebrates, and mammals. Additionally, the animals degrade habitat by rooting and digging wallows. Hardwood plantings used to restore marginal agricultural lands to productive, forested, wildlife habitat are threatened by these animals. Also, there is the potential for the feral hog to carry and transmit a number of infectious diseases to resident wildlife and humans. Currently, the refuge allows the take of feral hogs during any legal refuge hunt, but the staff has implemented no further control measures. Similar to the beaver and nutria problem, the refuge does not have the resources to pursue sufficient control to protect the habitat and wildlife from this threat.

Permit System
As necessary to protect refuge resources, the staff may issue special use permits to individuals for the take of nuisance beaver, nutria, and feral hogs. These permits may be issued refuge-wide, or permitees may be directed to certain areas with known overpopulation or habitat damage issues. The take may consist of trapping, shooting, or other methods approved by the AGFC, and the permitee will be allowed to retain the animals, pelts, tails, and any bounties from animals taken under the special use permit. Because there are advantages to trapping or shooting in virtually all seasons, permits will be valid year-round, unless otherwise specified in the permit, or specified later by the refuge manager. In the case of feral hogs, control measures will be limited to shooting and/or live trapping. Captured animals will be dispatched by gunshot.

Availability of Resources: Refuge staff and resources are adequate to administer this program. Refuge expenditures for issuing special use permits, oversight, and enforcement will be minimal. To closely monitor the program and to protect non-target animals, the refuge may issue only a small number of permits annually.

Anticipated Impacts of Use: The take of nuisance animals will involve the use of vehicles, boats, ATVs, or walking in approved areas, setting of traps or snares, and discharge of firearms, which will result in only normal short-term disturbances similar to those associated with other refuge-approved uses (e.g., hunting, fishing, birding).

With respect to beavers and nutria, the short-term benefits of this program should result in decreased nuisance animal populations and reduced inundation of refuge habitats and damage to infrastructure. As nuisance animal populations decrease, the number, size, and frequency of rebuilt beaver impoundments should also decrease. The refuge will spend less time and expense on the removal of impoundments and can redirect these resources to other habitat restoration and management activities. Damage to infrastructure and habitat should be reduced. In the long term, degraded habitats will return to a more normal hydrologic regime and will be reclaimed by native hardwoods and natural riparian vegetation, which will result in increased benefits to trust resources and associated wildlife-dependent recreation.

With respect to feral hogs, the short-term benefits of this program should be realized in re-growth and/or recovery of hardwood plantations, and other young plant communities and soils that were formerly disturbed. In addition, local wildlife populations will have relief from this non-native competitor/predator. In the long-term, a reduction in feral hog numbers and associated damage

and disease potential will result in enhanced conditions for trust resources and associated wildlife-dependent recreation.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- The use will be administered under conditions of a special use permit issued by the refuge manager that will enable control efforts to be directed to problem areas and specify methods and procedures to ensure protection of staff, visitors, and refuge resources.
- Use will be conducted to minimize risk of injury or take of non-target species and disturbance to refuge habitats.
- Use will be conducted to avoid any conflicts with refuge visitors.
- Permitee will comply with all applicable state and federal regulations.
- Activities under the permit will not be conducted in waterfowl sanctuaries during annual closure periods.
- Permitee will provide locations of beaver dams and lodges and other problem areas, as well as number and location of species taken.
- All target animals will be immediately dispatched by gunshot.
- The permitee and his/her agents and guests shall save, hold harmless, defend, and indemnify the United States of America, its agents, and employees for loss, damages, or judgments and expenses on account of bodily injury, death, or property damage, or claims for bodily injury, death, or property damage of any nature whatsoever, and by whomever made, arising out of the permitees, his/her employees, subcontractors, or agents with respect to conducting activities connected with the special use permit within the lands administered by the refuge.
- The special use permit may be revoked at any time by the refuge manager.
- The refuge manager may discontinue this use at any time.

Justification: This use has been determined compatible provided the above stipulations are implemented. This use will facilitate the primary purpose of the refuge, which is to provide waterfowl habitat and to conserve other migratory birds and wildlife. This use will meet the mission of the National Wildlife Refuge System by conserving fish, wildlife, and plant resources on these lands and providing renewable resources for the benefit of the American public. This use will be administered in compliance with 50 CFR 29.1 and EO 13112.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
__X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

10) Description of Use: *Cooperative Farming*

Continue the existing cooperative farming program which includes the production of approximately 4,500 acres of primarily rice, soybean, grain, and moist-soil habitats on this 15,020-acre refuge. The farming program is necessary for meeting refuge purposes, goals, and objectives by providing supplemental food resources and/or habitat for waterfowl, shorebirds, other migratory birds, and other native wildlife. Farming would be conducted on a crop-share basis with the farmer providing all equipment, seed, fertilizer, labor, and other costs associated with growing and selling a crop(s). The refuge would not be required to provide any costs associated with growing the crop(s) and only provide the land base and oversight for the program.

Availability of Resources: The refuge does not have the staff or the funds to accomplish this critical habitat management program internally. Wildlife food production goals are accomplished through a cooperative agreement with a local farmer. Refuge staffing levels are adequate to administer the program through this cooperative agreement.

Anticipated Impacts of Use:

- Food is produced to help meet refuge purposes and goals (high-energy foods to maintain body condition and health of migrating and wintering waterfowl, wading birds, and shorebirds).
- Hydrology is partially restored on a portion of cropland acres.
- Increased diversity of habitats and forage for waterfowl and other migratory birds.
- Numbers and diversity of waterfowl and other migratory birds using refuge habitats for wintering, staging, and migration will increase.
- Soil erosion will occur, but impacts will be minor due to soil conservation measures.

Determination (check one below):

_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- Implement cropland management only on areas vital to meet objectives identified in Migratory Bird Biological Review.
- Reforest isolated fields to reduce forest fragmentation and provide forested corridors.
- Comply with provisions contained in the Cooperative Farming Agreement.
- Fall tillage will not be permitted without refuge manager approval.
- Only Service approved chemicals (insecticides and pesticides) may be used on the refuge.
- Use approved pesticides only when pest occurrence is at the economic threshold as determined by crop scouting.
- Incorporate crop rotation to minimize fertilizer and chemical use.
- Annual monitoring will be performed by refuge staff to assess suitability of crop production and habitat use by wildlife to enable necessary adjustments in annual programs.

Justification: The Migratory Bird Biological Review completed on Bald Knob NWR determined that farming was required to meet habitat objectives and dietary requirements of wintering waterfowl and fulfill the purposes of the refuge. The cooperative farming program is required to meet the identified management objectives for waterfowl, especially pintail, which are very dependent on open feeding areas provided in rice fields and moist-soil plant habitat. Without this program, the refuge could not meet management objective capabilities necessary to meet high-priority management goals. All migratory shorebird unit management is provided through the cooperative farming program under the management of the refuge. Shore and wading bird habitat is also created throughout the refuge as rice fields are irrigated. The Biological Review Team, which was composed of biologists,

academicians, researchers, and experienced refuge managers from other locations, recognized that the diverse habitat objectives for wintering waterfowl on Bald Knob NWR could not be accomplished without this program, and that rice and other crops are very important for feeding wintering waterfowl. It was the recommendation of this team that the cooperative farming program be continued due to the need for productive and diverse habitat for wintering waterfowl, migrating shorebirds, wading birds, and other migrating birds. This use will be administered in compliance with 50 CFR 29.1.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

11) Description of Use: Construction of Headquarters/Visitor Contact Station and expansion of Maintenance Shop at Bald Knob NWR

The current refuge office at Bald Knob NWR, located approximately 2 miles south of Bald Knob, Arkansas, in White County, is a single-wide government surplus trailer that has been in use since 1997. It is substandard and grossly inadequate to meet administrative and visitor services needs. Entry points, interior workspaces, and restroom are not fully accessible. The trailer does not contain actual office spaces, the exterior and interior walls are deteriorating and failing, the roof needs to be replaced, the HVAC system is inefficient, rooms are not sufficiently lighted or ventilated, health and safety issues exist, and it is infested with rodents and insects. Furthermore, there are no suitable spaces for staff/partners meetings, visitor reception, exhibit areas for education/interpretation, or secure storage. Rehabilitation or renovations are not cost effective or desirable.

Funding has been obtained through the American Reinvestment and Recovery Act (ARRA) for replacement of the existing office with a suitable facility. The proposed headquarters/visitor contact station would be 1-story, approximately 2,500 square feet in size, and would include 4 staff offices, conference room, break room, unisex staff restroom, law enforcement storage, utility/storage closets, fax/photocopy/file room, mudroom, separate male/female public restrooms, an exhibit area, and volunteer/receptionist area. This facility would be fully ADA-compliant, would provide adequate administrative function, and would enable suitable opportunities for visitor reception and interpretation. The building design would incorporate greening features, including energy-conserving lighting, HVAC and insulation, water-conserving systems, and options for alternate energy. These features would reduce carbon footprint compared to traditional buildings and would lessen environmental impacts. It also would provide a safe and comfortable environment for staff and visitors. The current office would be removed and the new headquarters/visitor contact station would be sited within close proximity to the current building within the existing office/maintenance shop grounds, which are already disturbed; therefore, new construction would necessitate minimal site disturbance and no wildlife habitat would be destroyed.

The current maintenance shop/equipment storage facility at Bald Knob NWR is inadequately sized and lacks the critical components to support maximum work capacity and capability. The existing structure consists of a 40x40-foot shop building, with an attached 60x40-foot 3-bay open pole shed. This facility does not provide enclosed workspace for heavy equipment repair and maintenance, contains no equipment lift, and is energy-inefficient. The exterior attached pole shed is not large enough to accommodate the refuge's heavy equipment fleet, thus causing millions of dollars of equipment to sit exposed to the elements. Due to these inadequacies, the shop building would be expanded by enclosing one of the existing pole shed bays; pouring a concrete floor; installing 2 overhead bay doors (to allow drive-through bay); adding energy efficient lighting, insulation, and HVAC system; and installing a hydraulic vehicle lift and adequate shelving and work table space. The pole shed expansion would include adding three, 20-foot open bays, installing a metal roof, gutter system, gravel floor, and expanding the shop yard and security fence enclosing the compound. This project would enable the refuge to conserve energy, create a safer workplace, and facilitate implementation of habitat and wildlife management projects.

The visitor contact station would be open to the public during regular business hours. More than 60,000 visitors would use this facility annually. The maintenance shop would provide work area and storage for most of the heavy equipment of the station and would be used by staff, volunteers, YCC, interns, and other authorized persons.

Availability of Resources: The planning/design, engineering, and construction of the **h**eadquarters/visitor contact station would be funded through the ARRA. The shop expansion would be funded through the Deferred Maintenance Program. The new facilities would incorporate energy-conserving features and low maintenance design and components. Annual maintenance and operations needs are expected to remain within the capabilities of the staff and funding levels.

Anticipated Impacts of the Use: Minor, temporary surface disturbance would occur around the construction site. Proper erosion control measures would be implemented and disturbed surfaces would be revegetated following construction. The new buildings would replace the existing ones and would be located within the existing office-shop complex; therefore, no wildlife habitat would be destroyed. Noise and activity around the construction site may temporarily displace some wildlife such as birds, small mammals, reptiles, and amphibians. Some trampling of vegetation and perhaps small vertebrates and invertebrates may occur, but these losses would be minor. The impacts of these activities would be temporary and not cumulative over the long-term. The new buildings would incorporate green-building design and features that would lessen the environmental effects of the operation and use of the facilities.

Determination:

_____ Use is Not Compatible

___X___ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Energy-conserving features would be incorporated into building design, construction activities would be conducted in such a manner that disturbance to the site and wildlife would be minimized, and safety precautions would be implemented to prevent risk of injury to visitors and staff. The new facilities would be used to enable better fulfillment of refuge purposes and facilitate management programs for the benefit of trust species.

Justification: This project is not a new construction but a replacement of an existing structure utilizing an existing disturbed site. Expansion of the shop would occur on the existing building site. Work activities would have no or negligible environmental effects. This project is completely funded through ARRA and will enable the refuge to better fulfill refuge purposes by facilitating habitat restoration, management, and conservation programs for trust species. Furthermore, the construction and operation of these facilities would promote compatible public uses, including environmental education and interpretation, that would serve to increase public awareness of the need for and value of Bald Knob NWR and the Refuge System, and garner support for refuge programs.

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

_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:_____

BIG LAKE NATIONAL WILDLIFE REFUGE COMPATIBILITY DETERMINATIONS

Uses: The following uses were found to be appropriate and evaluated to determine their compatibility with the mission of the National Wildlife Refuge System and the purposes of the refuge.

1. Hunting
2. Fishing
3. Wildlife Observation and Photography
4. Environmental Education and Interpretation
5. Research and Monitoring
6. Forest Products Harvesting
7. Commercial Guiding for Wildlife Observation/Photography
8. Commercial Video and Photography
9. Nuisance Animal Control
10. Commercial Fishing
11. Construction of Headquarters/Visitor Contact Station and Maintenance Shop

Refuge Name: Big Lake National Wildlife Refuge

Date Established: August, 1915

Establishing and Acquisition Authority(ies):

Executive Order 2230, dated August 2, 1915

Migratory Bird Conservation Act

Refuge Purpose:
"…as a refuge, reserve and breeding ground for native birds" (Executive Order 2230, dated August 2, 1915.)

"…for use as an inviolate sanctuary, or for any other management purposes, for migratory birds. " 16 U.S.C. 715d (Migratory Bird Conservation Act).

To manage the Big Lake Wilderness as part of the National Wilderness Preservation System according to the Wilderness Act of 1964, as compatible with the purposes for which Big Lake NWR was established.

National Wildlife Refuge System Mission:

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

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

Other Applicable Laws, Regulations, and Policies:

Antiquities Act of 1906 (34 Stat. 225)
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)
Criminal Code Provisions of 1940 (18 U.S.C. 41)
Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250)
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)
Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat.1119)
Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)
Wilderness Act (16 U.S.C. 1131; 78 Stat. 890)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)
Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
The Property Clause of the U.S. Constitution Article IV 3, Clause 2
The Commerce Clause of the U.S. Constitution Article 1, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System. March 25, 1996
Title 50, Code of Federal Regulations, Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

NOTE: Compatibility determinations for each use listed were considered independently. However, for brevity within this Appendix, the preceding sections from “Uses” through “Other Applicable Laws, Regulations and Policies” and the succeeding sections, “Literature Cited,” “Public Review,” and the “Approval of Compatibility Determinations” are only provided once for each refuge within this Appendix. However, those sections omitted in this CCP remain as part of each compatibility determination and will be included in any compatibility determination that may be printed separately from the CCP.

1) Description of Use: *Hunting*

Hunting opportunities on Big Lake NWR include the take of squirrel, rabbit, deer, raccoon, and opossum. Additionally, hunters may take beaver, muskrat, nutria, armadillo, coyote, and feral hog incidental to the hunting of game species listed above. The refuge is closed to all migratory bird hunting. All hunts fall within the framework of the Arkansas Game and Fish Commission (AGFC) open seasons and follow AGFC regulations. There are refuge-specific regulations that supplement and further restrict the AGFC regulations. Refuge-specific regulations are reviewed annually and incorporated into the refuge hunting brochure. All hunters are required to read the refuge brochure

and adhere to all regulations contained therein. A hunting permit on the front cover of the brochure must be signed by the hunter and must be carried on his person while hunting on the refuge.

A large portion of the refuge is seasonally closed as a waterfowl sanctuary. That portion of the refuge, designated as the waterfowl sanctuary, is closed to all public entry and use (including hunting) from November 1 to February 28. Dogs are allowed for squirrel, rabbit, raccoon, and opossum hunting. Hunter access to hunt areas is by motor vehicle, boat, bicycle, or foot. All vehicles, including bicycles, may only be used on designated roads, parking areas, or levee tops and are not allowed in fields or other areas. Mobility-impaired hunters may apply for a special use permit, allowing specialized use by ATV on Oak Island Trail only.

Availability of Resources: Adequate resources are available to ensure and administer the proposed activity at its current level of participation. Enforcement of refuge regulations to protect trust resources and provide for a safe, quality recreational opportunity will occur via patrols by refuge law enforcement officers. Additionally, personnel from the AGFC and Mississippi County Sheriff's Department will patrol the refuge and assist refuge officers when needed.

Anticipated Impacts of Use: The incidental taking of other wildlife species, either intentionally or unintentionally, may occur with any consumptive use program. At current and anticipated public use levels for this program, this incidental take would be very small and would not directly or cumulatively impact population levels on the refuge or in the surrounding area. Implementation of a highly effective law enforcement program and continued development of special regulations for this use would eliminate most incidental take, other violations, or safety problems.

Currently, the refuge has an eagle nest sanctuary; however, it falls entirely within the seasonally closed area and therefore no access is allowed during the hunting season. The federally endangered fat pocketbook mussel occurs in an isolated area of the refuge, but this use will have no effect on that species. Impacts such as trampling small vertebrates or invertebrates and crushing/trampling of vegetation would be minimal. Additionally, the activities of hunters traveling to and from hunt areas and their activities while hunting would disturb some non-target wildlife, but these disturbances are temporary, short-term, non-lethal, and not highly repetitive. As a consumptive use, hunting would have some minimal and short-term direct negative impacts on refuge resources. Numbers of resident game animals would be temporarily reduced as animals are harvested, but these individual and collective losses would be compensated by recruitment during the following reproductive season; therefore, no long-term cumulative losses in populations would result.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Hunting is permitted in accordance with the AGFC regulations and licensing requirements. The refuge is closed to all migratory bird hunting. Additional refuge-specific regulations further restrict the AGFC regulations. The waterfowl sanctuary is closed to all public entry and use, including hunting, from November 1 to February 28. Hunters must sign out after completion of the hunt and provide harvest information at the Hunter Check Station. Boats will be monitored in flooded areas and activities modified if warranted to ensure compatibility. Public access to hunting areas may be closed at any time necessary to protect refuge resources or visitors. Possession or use of alcoholic beverages while hunting is prohibited.

Refuge-specific regulations that pertain to small game hunting include:

- Spring squirrel season closed.
- Only approved non-toxic shot or rimfire rifles may be possessed and used for all small game hunting. The possession or use of buckshot is prohibited.
- Dogs are allowed north of Timm's Point for squirrel and rabbit hunting.
- Dogs are required for night hunting of raccoons and opossums.
- Beaver, muskrat, nutria, armadillo, coyote, and feral hog may be taken incidental to any refuge hunt by the use of the device appropriate for that hunt and according to any applicable AGFC regulations.

Refuge-specific regulations that pertain to big game hunting include:

- Deer (Archery/Crossbow): November 1 – December 31.
- Harvested deer must be recorded at the self-checking station located at the refuge entrance near the office.
- Only portable stands capable of being carried by one person may be used and the owner's name and address must be permanently affixed to the stand.
- Stands may be erected seven days prior to the refuge archery deer season and must be removed by the last day of archery season.
- For the refuge archery hunt, the statewide bag limit of three deer applies.
- The maximum number of bucks that can be harvested is two. A legal buck on the refuge is defined as any male deer (no antler restriction).

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, hunting is a priority public use activity that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

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

_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

2) Description of Use: *Fishing*

Fishing and frogging are the most common public uses on Big Lake NWR. Big Lake encompasses 4,600 acres of open water for boating and ample areas exist around ditches and water control structures for bank fishermen. Fishing is permitted from March 1 through October 31 on all refuge waters. Fish creel and frog limits, boating safety, and license requirements are in accordance with the Arkansas Game and Fish Commission (AGFC) regulations. Access to fishing areas is by motor vehicle, boat, bicycle, or foot. All vehicles, including bicycles, are restricted to designated roads, levee tops, and parking areas. Fishing is permitted with the use of rod and reel, pole and line, limb line, yo-yo, jug line, trotline, and bow and arrow (on line). Fishermen are also permitted to collect crawfish with rakes and/or traps for personal use only. Harvesting of turtles and mussels is prohibited. A waterfowl sanctuary, established on the refuge north of Sand Slough Dam, is closed to all public entry and use (including fishing) from November 1 to February 28. The area below Sand

Slough Dam is open to winter fishing; however, it is limited to electric trolling motors only. Fishing from electronically operated water control structures is prohibited. Possession of largemouth bass less than 15 inches is prohibited.

Commercial fishing is authorized only by special use permit and is covered under a separate compatibility determination.

Availability of Resources: Refuge staff and resources are adequate to cover management of fishing at current levels. However, it is anticipated that an increase in this use may occur over the coming years. In order to provide safe and quality fishing, additional resources and staff will be needed to enhance or develop additional access areas and provide law enforcement. A portion of the refuge's budget is spent annually managing for the benefit of freshwater fisheries, maintaining boat launching ramps, improving access, conducting law enforcement patrols, and ensuring refuge visitors are in compliance with boater safety and refuge regulations.

Anticipated Impacts of the Use: Fishing and frogging should not adversely affect the fisheries resource, wildlife resource, or any other natural resource of the refuge. Monitoring of frogs will be implemented to gauge trends in numbers and habitat use. The activities associated with fishing and frogging, including travel to and from fishing areas, may cause trampling of vegetation, small invertebrates, and vertebrates; however, these are short-term, relatively minor, and not highly repetitive. Most of the trampling occurs along road shoulders and along ditch banks where bushhogging takes place to control woody vegetation. The federally endangered fat pocketbook mussel occurs in an isolated area of the refuge, but is not affected by fishing and frogging activities. A Bald Eagle pair has successfully nested since 1993 in the lake and the nest area is protected as an eagle sanctuary (closed area) during the nesting season. Apparently there have been no negative effects from public use on the lake.

Fishing is a wholesome, enjoyable, and wildlife-dependent public use opportunity; however, participation in this activity generally results in litter on the refuge (fishing line, food, bait containers, soda/beer cans, and other "trash") that must be removed numerous times per year in order to keep the refuge looking presentable. Trash is detrimental to the aesthetics of the refuge and can impact the digestive tracts of birds, turtles, fish, and other resident and migratory wildlife. The refuge would strive to reduce this problem by working with partners to pick up litter, educating anglers not to litter, and through law enforcement. Information contained in the refuge brochure concerning rules and regulations also helps keep negative impacts to a minimum. Regulations are reviewed annually and modifications are made as necessary to maintain compatibility and ensure a safe and quality fishing program.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Fishing and frogging are permitted in accordance with AGFC regulations and licensing requirements with additional refuge-specific requirements. Conflicts between anglers and hunters or other visitors using the refuge for non-consumptive wildlife recreation have not been a problem and are not expected to be a problem in the future. Associated violations, such as taking under-sized fish, open fires, and littering, can be minimized by public outreach and a continued law enforcement presence.

The following refuge-specific regulations help ensure the refuge fishing program is compatible with refuge purposes.

- All fishing tackle must be attended at all times.
- Crawfish may be collected for personal use only. All crawfish traps must have the owner's name and address permanently affixed.
- Taking or possessing turtles and mussels is prohibited.
- Only fishing with rod and reel, pole and line, limb line, yo-yo, jug and line, trotline and bow and arrow (on line) will be allowed; no other methods or tackle will be permitted unless issued under a refuge special use permit.
- The waterfowl sanctuary is closed to all public entry and use (including fishing and frogging) from November 1 – February 28.
- Personal watercraft (e.g., jet-skis, hovercraft, and airboats) are prohibited.
- Public access to fishing areas may be closed at any time necessary to protect refuge resources or visitor safety.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, fishing is a priority public use activity that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

3) Description of Use: *Wildlife Observation and Photography*

Wildlife observation (viewing) and photography are important public uses at Big Lake NWR. Abundant wildlife and convenient access make Big Lake NWR a destination for visitors hoping to observe and photograph a variety of wildlife and their habitats. Visitors are especially interested in viewing waterfowl, white-tailed deer, bald eagles, and songbirds. Access to the refuge is by vehicle, boat, bicycle, or foot. All vehicle use, including bicycles, is restricted to designated roads and parking areas only, and is not allowed on hiking trails, fields, or other areas. A wheelchair-accessible observation pier, complete with a fixed focus permanent spotting scope, is available to view the southern lake area and the 32-acre wildlife observation area. Parking lots are available along levees on the 10-mile Bald Cypress Wildlife Drive. The public is allowed use of these facilities during daylight hours. A visitor contact station is located in the headquarters building and is open to the public during normal staff working hours to provide visitors with maps and directions for photography and observation. There is a small wildflower planting adjacent to the office that attracts butterflies. Timm's Point provides the visitor an excellent opportunity for year-round use to view and photograph wildlife.

Availability of Resources: Refuge staff and resources are adequate to administer the program at current levels. However, it is anticipated that an increase in these uses will occur over the coming years. In order to provide safe and quality wildlife observation and photography opportunities, additional resources and staff will be needed to enhance or develop additional viewing areas and provide improved facilities and programs.

Anticipated Impacts of Use: The use will be allowed in designated areas only. The refuge has ample sites where wildlife disturbance will be minimal and still provide the user with excellent wildlife viewing opportunities. Plans for additional facilities, such as observation decks, boardwalks, and trails, will minimize visitor impacts or conflicts with other uses. These low-level impacts may include trampling of vegetation, invertebrates, and small mammals, and temporary disturbance to wildlife species in the immediate area during the activity. Littering also may occur.

Determination (check one below):
_____Use is Not Compatible
___X___Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: The users must adhere to all applicable refuge regulations and the use is allowed only during daylight hours. The waterfowl sanctuary is closed to all public entry and use from November 1 – February 28. Regulations governing public use are reviewed annually and any necessary modifications are made to ensure refuge resources are protected and visitors can enjoy a safe and quality experience. Wildlife observation and photography uses will be monitored and appropriate management action will be taken to eliminate or reduce associated impacts. Public access to wildlife observations and photography areas and facilities may be closed periodically for appropriate visitor and/or resource protection.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, wildlife observation and photography are priority public use activities that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X___Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

4) Description of Use: *Environmental Education and Interpretation*

On Big Lake NWR, environmental education and interpretation activities are conducted to inform and educate the public and provide an understanding of natural resource values and refuge purposes and the mission of the National Wildlife Refuge System. The environmental education and interpretation program facilities will include visitor contact areas, kiosks, platforms or towers, routes, or trails, and other designated public use facilities or access areas. In addition, refuge staff provide off-site environmental education and interpretation services at local events, such as festivals, fishing derbies, school classes, and civic or conservation group meetings. Access to the refuge is by vehicle, boat, bicycle, or foot. All vehicle use, including bicycles, is restricted to designated roads and parking areas only, and is not allowed on hiking trails, fields, or other areas.

Availability of Resources: Refuge staff and resources are adequate to administer the program at current levels. However, it is anticipated that an increase in these uses will occur over the coming years. In order to provide safe and quality environmental education and interpretation opportunities, additional resources and staff will be needed to develop or provide enhanced programs and interpretive facilities (such as visitor contact stations, observation platforms, interpretive trails, kiosks, and other facilities). Plans are being developed to provide additional or improved facilities as described herein. Additionally, the utilization and development (training) of volunteers may supplement environmental education and interpretation programs.

Anticipated Impacts of Use: Outdoor environmental education and interpretation activities may result in minimal and temporary disturbance to wildlife from visitors. It is possible that some small vertebrates, invertebrates, and vegetation could be trampled. Littering may also occur. Significant indirect or direct, cumulative adverse impacts to refuge resources are not expected from these activities. Environmental education and interpretation facilities, such as blinds, boardwalks, exhibits, kiosks, platforms, and towers, will be designed and established to minimize potential disturbance to wildlife and impacts to resources. The federally endangered fat pocketbook mussel occurs in an isolated area of the refuge; this use will not have any impacts to the mussel or its habitats.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Environmental education and interpretation activities conducted outdoors should be appropriately located to minimize impacts and may need to be rotated or moved periodically. The waterfowl sanctuary will be seasonally (November 1 - February 28) closed to all public entry and use, including environmental education and interpretation. Regulations concerning public use are reviewed annually and any necessary modifications are incorporated into refuge brochures or otherwise conveyed to visitors. Environmental education and outreach can be taken into the classroom, incorporated into presentations, and will be used at other forums; these activities will have no deleterious affect on fish and wildlife at the refuge.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, environmental education and interpretation are priority public use activities that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

5) Description of Use: *Research and Monitoring*

Big Lake NWR would allow university students and professors, as well as governmental or non-governmental employees and volunteers, to conduct short- or long-term research and monitoring studies. Such research and monitoring would be conducted in various habitats throughout the refuge and with various species of migratory birds, resident wildlife, and fish. The information collected would provide a better understanding of ecosystem functions and responses to management actions. Research and monitoring results would help managers to evaluate prior management actions, identify adaptive management options, and develop "Best Management Practices." The knowledge gained through research and monitoring studies would allow more effective management decisions. All research and monitoring project requests would be evaluated on individual project merit and applicability to refuge programs on a project-by-project basis.

Availability of Resources: Resources are adequate to administer research and monitoring activity at the current level. The refuge will also seek to establish and/or expand partnerships for continued research and monitoring projects conducted by other organizations on refuge lands.

Anticipated Impacts of Use: There could be some negative impacts from scientific research and monitoring on the refuge. Impacts such as trampling vegetation, ATV and motor boat use, and temporary disturbance to wildlife could occur. A small number of individual plants or animals may be collected for further study. These collections would not likely adversely affect refuge plant and animal populations. Removal of plant and animal material from the refuge, as well as the potential to accidentally introduce exotic plants and animals, must be carefully monitored and controlled. Some other impacts from research include: (1) Noise disturbance from helicopter, airplane, motor boat, airboat, truck, car, or ATV that may temporarily disturb and/or displace wildlife; (2) physical presence of people or equipment that may temporarily disturb and/or displace wildlife; (3) ground disturbance from walking on site or the use of equipment; and (4) water disturbance by stirring sediments and causing temporary turbidity from equipment or walking. The federally endangered fat pocketbook mussel occurs in an isolated portion of the refuge, but this use will not negatively impact this species. Despite these impacts, which are short-term, the knowledge gained from carefully considered and properly executed scientifically defensible research and monitoring would provide information and justification to improve management techniques and better meet the needs of trust species. Research/monitoring activities on the refuge are not expected to indirectly or cumulatively impact refuge resources negatively, even though some minimal short-term and direct impacts may occur.

Determination (check one below):
_____Use is Not Compatible
___X___Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: All researchers would be required to obtain and possess a special use permit. Individual requests to use specialized equipment, all-terrain vehicles, etc., would be evaluated on a project-by-project basis and specified on each permit. Researchers would periodically be evaluated for compliance with requirements. Periodic progress reports would be required and final copies of all reports and publications would be provided to the refuge. The refuge would not directly supply personnel or equipment unless arrangements were made prior to issuance of the special use permit. The refuge manager would reserve the right to delegate a staff member to accompany permitee(s) at any time. All plants or animals sampled, collected, or released would be done in a scientifically accepted manner, such as those specified by scientific societies. Examples of these societies include the Society for the Study of Amphibians and Reptiles, the American Society of Mammologists, the American Ornithological Society, the Ichthyologists League, the Entomological Society of America, and the Botanical Society of America. Incidental take and inadvertent trampling of vegetation or wildlife are expected to be minimal and will be addressed with each special use permit. Given compliance with the restrictions set in each permit, research and monitoring conducted on the refuge is considered to be compatible with the purposes for which the refuge was established.

Justification: Sound research and monitoring programs provide a better understanding of species, habitats, and the environmental communities present on the refuge. Additional research and monitoring is needed to assess management programs used on the refuge and evaluate alternative options. The benefit of additional knowledge will greatly outweigh any temporary or short-term disturbance or loss of individual plants or animals that may occur. This activity will provide guidance to management for fulfilling refuge purposes and meeting established goals and objectives through adaptive management.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

6) Description of Use: *Forest Products Harvesting*

Conduct a comprehensive forest management program on Big Lake NWR in accordance with an approved forest management plan. Refuge forest habitats will be evaluated over a 3-year cycle. Prescriptions detailing needed actions will then be drawn up, approved from the Service's Regional Office, and carried out on a yearly basis. It is proposed that select trees be sold, and then removed by commercial operations. The forest habitat may also be manipulated by permitees/staff when commercial sales are not feasible. Only trees needing to be removed in order to improve the forest habitat for wildlife or to restore the integrity of the forested wetlands ecosystem will be taken or manipulated. Special use permits may be issued for firewood cutting (personal use) when there is excess downed wood from silvicultural operations or when roads are widened. Seasonal special use permits may be issued for gathering seed, on a limited basis, when forest seed crops are abundant.

Operations may be conducted throughout the year, but only according to the guidelines detailed in the Forest Habitat Management Plan. Operations may involve numerous individuals using hand tools such as chain saws and heavy equipment such as feller-bunchers, skidders, bulldozers, and log trucks.

Availability of Resources: Some elements of needed resources are already in place, such as the forester's time and salary, and the small amount of time needed by other positions in maintenance, law enforcement, management, and administration. Additional expenses for equipment maintenance, operating expenses, and habitat restoration can be funded out of the refuge's budget. The Forest Habitat Management Plan allows that management will be carried out to the extent of available resources (see Section 3.2; Physical Plant and Equipment Use Requirements for a more detailed description).

Anticipated Impacts of the Use: Timber harvest operations will result in short-term disturbances and long-term benefits to forest habitats. Short-term impacts will include disturbance and displacement of wildlife, vegetation, and soils typical of any heavy equipment operation. Operation of heavy equipment and removal of some vegetation will also result in a short-term increase in soil erosion. Additionally, wildlife species dependent on undisturbed forest habitat will be temporarily displaced. As vegetation is disturbed, other wildlife species may also be temporarily displaced. Over time, these short-term impacts will wane as the effects of improvement treatments develop and the benefits are realized. The refuge is divided into four forest compartments; therefore, short-term impacts will be minimized by implementing the proposed actions in only a small percentage of the refuge at any given time.

Firewood cutting and forest seed collection will result in temporary disturbances. Seeds are gathered by hand and sold to local nurseries that, in turn, grow seedlings. The refuge has a need for seedlings to restore marginal cropland and other open fields. By allowing a limited forest seed harvest, the refuge is ensuring a continued supply of suitable seedlings of local origin for forest restoration. In the past, participation in refuge firewood cutting and hand collection of forest seeds has been low, and future participation is also expected to be low. The quantity and frequency of firewood cutting and seed harvesting is not expected to result in significant disturbance, diminish wildlife food resources, or jeopardize wildlife survival. Short-term disturbance to wildlife may occur during these activities, but will be insignificant because of the small scale of the projects. Most of the use will occur in late summer or fall, after ground nesting birds have completed the nesting season. Firewood cutting or seed collection should not result in short- or long-term impacts that adversely affect the purpose of the refuge or the mission of the National Wildlife Refuge System.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:
See General and Specific Guidelines in the Forest Habitat Management Plan, Appendix 7.10 and 7.11.

7.10 General Conditions Applicable To Timber Harvesting Permits

Subcontractors: Subcontractors or agents may be employed with authorization from the refuge forester.

Safety Requirements: The contractor must perform this contract in a safe manner, observing any necessary safety precautions. The contractor will promptly correct any condition, which, in the opinion of the refuge manager or his authorized representative, endangers the safety of personnel, the public, and/or property during the performance of this contract. Failure to observe this requirement will result in contract termination, with the contractor liable for any such damages that may occur.

Liabilities of the Contractor: The contractor will hold the government and all its representatives harmless from all suits, actions, or claims of any character arising out of the injuries to any person or damage to any property resulting from any neglect in the performance of the services required by this contract, or from any claims arising or recovered under the Workman's Compensation laws or any other law, by law, ordinance, order or decree, or on account of any other act or omission by the contractor or his employees while carrying on operations under this contract. This responsibility will terminate when suits, actions, or claims have been satisfied.

Insurance Coverage: The contractor must be covered by adequate insurance, as the government will assume no liability whatsoever as a result of the contractor's operations under this contract.

Inspection of Work Site: Before submitting a bid, prospective bidders are urged to personally inspect the site. Arrangements to view may be made by contacting Cache River National Wildlife Refuge, Augusta, Arkansas. Telephone (870) 347-2614.

7.11 Special Conditions Applicable To Timber Harvesting Permits

- A pre-entry conference between the refuge forester and the designated permitee representative will be required before the permitee starts logging operations. The purpose of the pre-entry conference is to be sure that the permitee completely understands what is expected and thus minimizes conflicts.
- All refuge wildlife is protected. All reasonable efforts will be made by the permitee to protect wildlife from harm and harassment.
- All logging will be within the boundaries specified on the attached map.
- Trees will be cut so as to leave ground-level paint spots visible after the tree has been cut. All marked trees are to be cut, with the exception of marked leave trees in shelterwood, seed tree, or small open areas as described in the special use permit.
- Only marked or designated trees will be cut. Care will be taken to protect all other trees and vegetation from damage. Unmarked trees that are cut or injured through carelessness will result in a fine of $5 per inch diameter at stump height or breast height if present.
- Trees and tops will not be left hanging or supported by any other tree and will be laid down immediately after felling.
- Tops and logging debris will be lopped to within 6 feet of the ground in all areas 100 feet or less from major roads.
- All roads, rights-of-way, active agricultural fields, designated openings, ditches, and streams must be kept clear of tops and debris. The permitee is required to repair all damage resulting from operations conducted under this permit.
- The skidding of logs greater than 20 feet in length may be prohibited in designated areas.
- The refuge manager or his authorized representative must approve the location of additional roads. Additional trees removed for roads or loading sites will be marked by the refuge forester and paid for at bid price.
- Loading of forest products on public roads or shoulders or regeneration areas is prohibited.
- Logging will not be permitted when the ground is wet and subject to rutting and severe compaction. The permitee and his employees will do all in their power to prevent rutting and erosion.
- The permitee and his employees will do all within their power to prevent and suppress forest fires. Fires will be reported immediately to the refuge office.
- Ownership of all products remaining on a sale area will revert back to the government upon termination of the permit.

- Littering in any manner is a violation of the Code of Federal Regulations. The entire work area will be kept free of all litter at all times.
- The possession or use of firearms or other weapons on the refuge is prohibited outside of hunting seasons.
- The government accepts no responsibility to provide right-of-way over private lands for materials sold under this contract.
- The refuge manager or his authorized representative will have the authority to temporarily close down all or any part of the operation during a period of high fire danger, wet ground conditions, or for any other reason deemed necessary. Additional time, equal to the closing period, will be granted to the permitee.
- The decision of the refuge manager will be final in the interpretation of the regulations and provisions governing the sale, cutting, and removal of the timber products covered by this permit.

Justification: This use has been determined compatible provided the above stipulations are implemented. This use will facilitate the primary purpose of the refuge, which is to provide waterfowl habitat and to conserve other migratory birds and wildlife. This use will meet the mission of the National Wildlife Refuge System and enhances fish, wildlife, and plant resources on these lands by providing renewable resources for the benefit of the American public. This use will be administered in compliance with 50 CFR 29.1.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

7) Description of Use: *Commercial Guiding for Wildlife Observation/Photography*

Allow commercial guiding to facilitate Wildlife Observation/Photography on Big Lake NWR. The objective is to provide the opportunity to experience wildlife observation and photography to the segment of the public lacking the knowledge or equipment required to view/photograph fish, wildlife, plants, or their habitats in compliance with the legal mandates of the National Wildlife Refuge System Improvement Act of 1997 concerning compatibility and priority public use. The surrounding communities, including Manila, Blytheville and Leachville, are dependent on supporting refuge visitors throughout the year. Within these communities, grocery stores, sporting goods stores, restaurants, lodges, and other businesses obtain a large proportion of their annual income from the influx of refuge visitors. Although wildlife observation and photography are involved on guided trips, the commercial nature of guiding activities associated with these uses does not qualify as one of the six priority public uses (Federal Register/Vol.65, No.202/Wednesday, October 18, 2000/Rules and Regulations-Issue 13: Priority Uses, Pages 62471 and 62472). All commercial activities, including guiding of wildlife observers and photographers, are special type uses that may be authorized when they are appropriate and compatible with the purpose of the refuge, the mission of the National Wildlife Refuge System, and can be administered in a way that minimizes conflicts with priority uses and does not hinder the activities of visiting public not using guide services.

Guiding and equipment may involve the use of vehicles, buses, motor boats, paddle boats, canoes, and hiking. Guiding will be allowed only in designated areas and according to conditions specified by the refuge manager. Several miles of refuge roads are also used to access remote sloughs, bayous, and lakes where wildlife observers and photographers may conduct their activities.

Guides will be allowed to operate through issuance of a special use permit, which must be renewed annually. Special conditions are attached and part of the special use permit designed to meet the above objectives and provide liability protection to the government. The annual fee for the special use permit will be $500.

Increased requests for special use permits to conduct wildlife observation and photography guiding on Big Lake NWR are expected in the future. The permits will be issued on a first-come, first-serve basis. The refuge reserves the option to limit the number of permits issued as necessary to ensure compatibility. Future requests for commercial wildlife observation and photography guiding special use permits will be reviewed by management and additional steps including limiting the number of guides, increasing annual special use permit fees, designating observation areas, or discontinuing this use entirely, as may be necessary to maintain safe and quality wildlife observation and photography opportunities for all refuge visitors.

Availability of Resources: Adequate funding and staff exist to administer refuge regulations and special use permit conditions at the current level of interest for this activity. An increase in special use permits may not be possible with the current existing staff. Any increase will be reviewed by management to ensure compatibility.

Anticipated Impacts of the Use: Commercial guiding for wildlife observation/photography would increase opportunities for the public to experience wildlife and gain an added appreciation for the value of Big Lake NWR and the National Wildlife Refuge System. This use would benefit a diverse set of participants from within and outside this local area. The use also would allow some economic benefit to local communities from refuge visitation. Minor impacts, such as short-term and temporary wildlife disturbance, could result. In addition, there could be minor trampling of vegetation and small vertebrates and invertebrates. These impacts are not expected to be significant.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: A special use permit is required.

- No special privileges are granted to the permitee other than those stated in the permit. Interfering with any other individual lawfully participating in any authorized activity on the refuge will be grounds for immediate revocation of the permit and for possible legal prosecution.
- The permitee and assistant each must comply with all applicable federal, state, and refuge laws, regulations, and policy.
- A copy of the special use permit must be in the possession of the permitee and assistant while engaged in commercial guiding activities.
- Guided parties are limited to fifteen (15) members and the permitee and his assistant who must all stay together as one (1) party on the refuge. Only one (1) party may be guided per day. The permitee must accompany all parties. Any exception to this requirement must be applied for and approved by the refuge manager prior to such event.
- Within one (1) week after the end of the calendar year, the permitee must furnish the refuge manager a written report on the number of individuals taken onto the refuge and fees charged.

- The special use permit may be terminated or revoked at any time without refund to the permitee for non-compliance with any of the terms thereof. Any violation may be grounds for future permit denial.
- The permitee and his/her agents and guests shall save, hold harmless, defend, and indemnify the United States of America, its agents, and employees for loss, damages, or judgments and expenses on account of bodily injury, death or property damage, or claims for bodily injury, death, or property damage of any nature whatsoever, and by whomever made, arising out of the permitees, his employees, subcontractors, or agents with respect to conducting activities connected with the permit within the lands administered by Big Lake NWR.
- Permitee must provide proof of liability insurance ($300,000 each occurrence, $500,000 aggregate) with the U.S. Fish and Wildlife Service named as co-insured prior to issuance of the special use permit.
- ALL equipment must be removed from the refuge daily.
- The refuge may limit the number of special use permits issued or discontinue this use entirely in order to ensure appropriateness, compatibility, and safe, quality opportunities for visitors not using guide services.

Justification: Commercial activities can be allowed on refuges when they do not conflict with the provisions of the National Wildlife Refuge System Improvement Act of 1997 and resulting policies and regulations. The special use permit conditions provide adequate regulation of this specialized activity and quality wildlife observation and photography opportunities for all refuge visitors will be ensured. Commercially guided wildlife observation and photography is a public use that will allow the unskilled or inexperienced participants to enjoy, experience, and learn about native wildlife and habitats in this bottomland hardwood environment. This commercial wildlife observation/photography use is being implemented in compliance with the legal mandates of the National Wildlife Refuge System Improvement Act, including compatibility.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-Year Re-evaluation Date:

8) Description of Use: *Commercial Video and Photography*

Allow commercial video and photography activities on Big Lake NWR for the purpose of exposing the public to the refuge and to promote recognition of the diverse wildlife and habitats found there. Over the past several years, Big Lake NWR has been contacted as to the possibility of producing commercial audio-visual productions such as video and still photographs. The refuge provides a variety of natural habitats abundant with wildlife and is an ideal setting for filmmakers. As central Arkansas and Service programs for visitors are promoted, demand for commercial filming on the refuge may increase.

Availability of Resources: Adequate refuge staff and resources are available to administer this activity at the current level.

Anticipated Impacts of Use: Commercially produced video and photography could result in some disturbance to wildlife. Some minimal trampling of vegetation, invertebrates, and small vertebrates may also occur. However, it is anticipated that this disturbance would be minimal, short-term, localized, and not highly repetitive. Commercially produced video and photography activities are not expected to indirectly or cumulatively impact refuge resources negatively.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Access for commercially produced video and photography activities would be allowed in designated areas only under special use permit. Activities would be monitored to document any negative impacts to wildlife; if negative impacts are found, corrective action would be taken to reduce or eliminate these impacts. Access to key observation and photography areas may be closed during adverse weather conditions for protection of infrastructure (roads, levees, etc.), and visitor safety.

Public Law 106-206, signed by the President on May 26, 2000, directed the Secretary of the Interior to require a special use permit and establish a reasonable fee for commercial filming activities on federal lands administered by the Secretary. This law further stated that for still photography neither a special use permit nor a fee is assessed if the activities take place on lands where members of the public are generally allowed. The Secretary may require a special use permit and fee if photographic activities take place at locations where the general public is not allowed or where additional administrative costs are likely.

The Secretary shall not permit any filming, still photography, or other related activity if the Secretary determines:

1. There is a likelihood of resource damage;
2. There would be an unreasonable disruption of the public's use and enjoyment of the site; or
3. That the activity poses health or safety risks to the public.

Further guidance is found in 43 CFR 5.1 and 50 CFR 27.71, which regulate the making of pictures, television productions, or sound tracks on national wildlife refuges.

- A special use permit is required of any party except amateur photographers or bona fide newsreel and news television photographers and soundmen. All other parties must obtain written permission from local officials having administrative responsibility for the area involved.
- However, the Secretary has determined that no fee will be charged for the making of such motion pictures, television productions, or sound tracks on areas administered by the U.S. Fish and Wildlife Service (Note: this provision is currently under Departmental review).
- A bond shall be furnished, or deposit made in cash or by certified check, in an amount to be set by the official in charge of the area to ensure full compliance with all conditions prescribed in the special use permit. Such bond may be refunded to the applicant if all special use permit requirements are met and no costs to the government are incurred.
- Permission to make a motion picture, television production, or sound track will be granted by the head of the Service or his/her authorized representative at his/her discretion and on acceptance by the applicant of conditions set forth in a special use permit. Applicants must describe the area where filming is requested and the scope of the filming or production or recording. Dependent upon weather conditions, applicants will state when filming or other production will begin and end.

Other stipulations include:

- Utmost care will be exercised to see that no natural features are injured, and after completion of the work, the area will, as required by the refuge manager, either be cleaned up and restored to its prior condition or left, after cleanup, in a condition satisfactory to the refuge manager.
- Credit will be given to the Department of the Interior and the U.S. Fish and Wildlife Service through the use of an appropriate title or announcement, unless the refuge manager issues a written statement that no such courtesy credit is desired. A copy of the final product will be provided pro bono to the refuge staff.
- Pictures will be taken of wildlife only when such wildlife will be shown in its natural state or under approved management conditions if such wildlife is confined.
- Any special instructions received from refuge manager will be complied with.
- Any additional information relating to the privilege applied for by the applicant will be furnished upon request.
- Other stipulations may be warranted depending upon the proposed location and season of the year the activity is conducted.

Further guidance on this activity is found in the Service Manual 650 FW 5.

The following stipulations apply to special use permits issued for commercially produced video and photography activities. To minimize impacts on refuge lands and resources, the refuge manager will ensure that filmmakers comply with policies, rules, and regulations, and will monitor and assess all activities of filmmakers.

- Failure to abide by any part of a special use permit: violation of any refuge-related provision in Titles 43 or 50, Code of Federal Regulations; or any pertinent state regulation (e.g., fish or game violation) will be considered grounds for immediate revocation of the permit and could result in denial of future permit requests for lands administered by the U.S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit.
- The permitee is responsible for ensuring that all employees, party members, and any other persons working for the permitee and conducting activities allowed by the special use permit are familiar with and adhere to the conditions of the permit.
- The special use permit may be canceled or revised at any time by the refuge manager for noncompliance or in case of emergency (e.g., public safety, unusual resource problems). The permitee and permitee's clients do not have exclusive use of this site(s) or lands covered by the special use permit.
- Prior to beginning any activities allowed by the special use permit, the permitee shall provide the refuge with (1) a copy of current business license; and (2) proof of comprehensive general liability insurance.
- Prior to conducting commercial filming activities, the permitee shall provide the refuge manager with the name and method of contact for the field party chief or supervisor.
- A valid copy of the special use permit, signed by the refuge manager or designee, must be in the party leader's possession at all times while exercising the privileges of the permit.
- Endorsement of the special use permit signifies the permitee's understanding and concurrence with all the conditions set forth in the General Conditions found on the reverse side of the permit and the above special conditions.

Under the stipulations described above, commercially produced filmmaking, production, or sound track recording is viewed as compatible with the purposes for which the refuge was established.

Justification: Commercial video and photography are economic uses that must contribute to the achievement of refuge purposes or the mission of the National Wildlife Refuge System. The products derived may educate groups of people that may not normally know about the refuge, such as the elderly, handicapped, or urban youth groups. The services provided by commercial filmmakers will be beneficial to extend public appreciation and understanding of wildlife, natural habitats, and the mission of the Refuge System. Conditions imposed in the special use permit of filmmakers ensure that these wildlife-dependent activities can occur without adverse effects to refuge resources or other visitors. The activity will be required to have a primary focus on education and information about refuge purposes and the Refuge System mission.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

9) Description of Use: *Nuisance Animal Control*

This activity would allow a managed and highly targeted program for the take of nuisance animals on Big Lake NWR that are harmful to refuge habitat and/or infrastructure critical to refuge habitat management and operations, and therefore a threat to the trust species that inhabit or utilize the refuge. Currently, this program will specifically address beaver, nutria, and feral hogs, but may be expanded to other species if necessary and in compliance with Arkansas Game and Fish Commission (AGFC) regulations, to address future harmful impacts caused by exotic or invasive species and prevent or control problems such as disease outbreaks involving furbearers or excessive predation on trust species.

Semi-aquatic Component
The hydrology and habitat of the refuge is such that semi-aquatic animals, specifically, beaver (*Castor Canadensis*) and nutria (*Myocastor coypus*), have become prolific and their dense populations have degraded habitat for other wildlife usage. Beaver naturally impound water to enhance accessibility and extend usable habitat beyond the stream channel. Under normal hydrologic and population conditions, beavers are held in check by availability of water and natural predators, and under these conditions their impoundments may provide beneficial aquatic microhabitats containing scrub-shrub vegetation and trees. Beaver and nutria have little pressure from natural predators. Beaver populations have grown to the point that impoundments have been rebuilt for many years and impounded areas have grown in size. Over the long-term, these impoundments degrade the habitat both within and surrounding the area because the woody vegetation within the impoundments decreases in diversity and abundance, and trees eventually will be excluded altogether. The water table surrounding the impoundment is elevated, altering the forest species composition and degrading quality and health. The hydrology itself is impacted as sediment and organic material from decomposing aquatic vegetation accumulates in the impoundment and impedes the ability of the site to dewater. Additionally, water quality in impounded areas is negatively affected due to increased water temperature and turbidity and decreased dissolved oxygen, and reduced species diversity.

Nutria are non-native herbivores that cause negative impacts on wildlife habitat by consuming and destroying aquatic vegetation, and burrowing in levees of migratory bird impoundments. Their constant burrowing causes roads and levees to collapse, which ultimately poses a major safety issues for refuge personnel and visitors. These activities degrade habitat managed for waterfowl, shorebirds, and other desired species. Their foraging activities also result in competition with waterfowl for food resources.

Refuge staff remove beaver impoundments annually and opportunistically, and conduct wintertime trapping and shooting, but do not have resources to consistently and effectively pursue sufficient control to protect the habitat resources from beaver and nutria impacts.

Terrestrial Component
The presence of feral hogs (*Sus scrofa*) has been documented on the refuge and observed on several occasions in the recent past. The animals are not native and have few natural predators. The hogs compete with resident wildlife for forage, which includes herbaceous vegetation, roots, acorns, invertebrates, and mammals. Additionally, the animals degrade habitat by rooting and digging wallows. Hardwood plantings used to restore marginal agricultural lands to productive, forested, wildlife habitat are threatened by these animals. Also, there is the potential for the feral hog to carry and transmit a number of infectious diseases to resident wildlife and humans. Currently, the refuge allows the take of feral hogs during any legal refuge hunt, but the staff has implemented no further control measures. Similar to the beaver and nutria problem, the refuge does not have the resources to pursue sufficient control to protect the habitat and wildlife from this threat.

Permit System
As necessary to protect refuge resources, the staff may issue special use permits to individuals for the take of nuisance beaver, nutria, and feral hogs. Special use permits may be issued refuge-wide, or permitees may be directed to certain areas with known overpopulation or habitat damage issues. The take may consist of trapping, shooting, or other methods approved by the AGFC, and the permitee will be allowed to retain the animals, pelts, tails, and any bounties from animals taken under the special use permit. Because there are advantages to trapping or shooting in virtually all seasons, permits will be valid year-round, unless otherwise specified in the permit, or specified later by the refuge manager. In the case of feral hogs, control measures will be limited to shooting and/or live trapping. Captured animals will be dispatched by gunshot.

Availability of Resources: Refuge staff and resources are adequate to administer this program. Refuge expenditures for issuing special use permits, oversight, and enforcement will be minimal. To closely monitor the program and to protect non-target animals, the refuge may issue only a small number of permits annually.

Anticipated Impacts of Use: The take of nuisance animals will involve the use of vehicles, boats, ATVs, or walking in approved areas, setting of traps or snares, and discharge of firearms, which will result in only normal short-term disturbances similar to those associated with other refuge approved uses (e.g., hunting, fishing, birding).

With respect to beavers and nutria, the short-term benefits of this program should result in decreased nuisance animal populations and reduced inundation of refuge habitats and damage to infrastructure. As nuisance animal populations decrease, the number, size, and frequency of rebuilt beaver impoundments should also decrease. The refuge will spend less time and expense on the removal of impoundments and can redirect these resources to other habitat restoration and management activities. Damage to infrastructure and habitat should be reduced. In the long-term, degraded habitats will return to a more normal hydrologic regime and will be reclaimed by native hardwoods

and natural riparian vegetation, which will result in increased benefits to trust resources and associated wildlife-dependent recreation.

With respect to feral hogs, the short-term benefits of this program should be realized in re-growth and/or recovery of hardwood plantations, and other young plant communities and soils that were formerly disturbed. In addition, local wildlife populations will have relief from this non-native competitor/predator. In the long-term, a reduction in feral hog numbers and associated damage and disease potential will result in enhanced conditions for trust resources and associated wildlife-dependent recreation.

Determination (check one below):
_____Use is Not Compatible
___X___Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- The use will be administered under conditions of a special use permit issued by the refuge manager that will enable control efforts to be directed to problem areas and specify methods and procedures to ensure protection of staff, visitors, and refuge resources.
- Use will be conducted to minimize risk of injury or take of non-target species and disturbance to refuge habitats.
- Use will be conducted to avoid any conflicts with refuge visitors.
- Permitee will comply with all applicable state and federal regulations.
- Activities under the special use permit will not be conducted in waterfowl sanctuaries during annual closure periods.
- Permitee will provide locations of beaver dams and lodges and other problem areas, as well as number and location of species taken.
- All target animals will be immediately dispatched by gunshot.
- The permitee and his/her agents and guests shall save, hold harmless, defend, and indemnify the United States of America, its agents, and employees for loss, damages, or judgments and expenses on account of bodily injury, death, or property damage, or claims for bodily injury, death, or property damage of any nature whatsoever, and by whomever made, arising out of the permitee, his/her employees, subcontractors, or agents with respect to conducting activities connected with the special use permit within the lands administered by the refuge.
- Special use permits may be revoked at any time by the refuge manager.
- The refuge manager may discontinue this use at any time.

Justification: This use has been determined compatible provided the above stipulations are implemented. This use will facilitate the primary purpose of the refuge, which is to provide waterfowl habitat and to conserve other migratory birds and wildlife. This use will meet the mission of the National Wildlife Refuge System by conserving fish, wildlife, and plant resources on these lands and providing renewable resources for the benefit of the American public. This use will be administered in compliance with 50 CFR 29.1 and EO 13112.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

10) Description of Use: *Commercial Fishing*

Allow commercial fishing by special use permit on specific areas of Big Lake NWR, primarily for removing exotic and non-game fish for the benefit of priority fish species and their habitats. Commercial fishing would occur in the lake and associated waters within refuge boundaries; access is by vehicle and boat, via existing boat launches. The habitat involved includes shallow lakes, streams, and associated wetlands and swamp. Key fish and wildlife species that occur in the proposed area include warm water game fish, waterfowl, and an active bald eagle nest. Commercial fishing opportunities are available to permit holders from March 1 through October 31, north of Sand Slough Dam. The lake closes November 1 through February 28 to adhere to waterfowl sanctuary status. From November 1 through February 28, fishing is restricted to the lake area below Sand Slough Dam with electric trolling motors only. Typically a small number of permits (three or four) are issued annually. Similar opportunities do not exist nearby.

Commercial fishing is utilized to remove fish commonly known as rough fish from refuge waters. The species permitted for commercial harvest include German carp, silver carp, big head carp, grass carp, black carp, buffalo, and catfish. The five carp species are exotics, which as a group, compete with and negatively impact habitat of native fisheries within the refuge and ecosystem. The overly abundant native buffalo, and to a lesser degree, catfish, also compete with other native fisheries.

Availability of Resources: Current facilities, equipment and staff are adequate to properly and safely administer this use.

Anticipated Impacts of Use: The primary impact is the removal of exotic, non-game fish. The program involves reducing numbers of these fishes (because eradication is not feasible) and reducing negative impacts to aquatic habitats and certain sport fishes. Incidental take of sport fish may occur in association with this use, but is not expected to result in any long-term or cumulative negative impacts. There is no long-term adverse impact to habitat or native fish and wildlife. Commercial harvest of non-game fish should enhance water quality and survival of other fish species, and provide local economic benefit.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Law enforcement officers would ensure compatibility through routine law enforcement patrols enforcing state and refuge-specific regulations. Arkansas Game and Fish Commission (AGFC) officers also occasionally patrol refuge waters and monitor the access areas. Specific refuge regulations ensure minimal disturbance of waterfowl and nesting bald eagles (closed areas). Refuge-specific regulations: only trolling motors and paddles are permitted in winter fishing areas November 1 – February 28; tackle must be registered at the refuge office; all tackle must be set in such a manner that is safe for the public and must be properly marked with permitee information; all tackle must be removed at the end of the season; monthly catch reports are required; maximum of two live boxes or nets allowed; entry into closed area is not permitted; turtle trapping is not permitted; and a special use permit is required.

Justification: One of the primary objectives of the National Wildlife Refuge System is to remove exotics from refuges and to restore historic native populations. Removal of exotics and a reduction in rough fish population by commercial harvest is a management practice aimed at reducing adverse impacts to water quality and aquatic habitats. Bottom feeders, such as carp and buffalo, stir up sediments, which exacerbates turbidity and impacts nesting and spawning habitat for other fishes.

Fishery biologists with the Service have long recommended commercial harvest of these species to refuge managers as a management tool, with the objective to increase/restore native fish populations on refuges. Commercial harvest of these species is considered a management economic activity that will result in removing exotics, improving quality of aquatic habitats, favorably impacting recreational fishing opportunities, and providing economic benefits to the local community. This use will be administered in compliance with 50 CFR 29.1.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

11) Description of Use: Construction of Headquarters/Visitor Contact Station and Maintenance Shop at Big Lake NWR

The current office and maintenance shop/equipment storage shed for Big Lake NWR, located approximately 3 miles east of Manila, Arkansas, in Mississippi County, were constructed in the mid-1970s and have deteriorated to the point where renovation and rehabilitation to correct deficiencies and inadequacies in structural integrity, accessibility features, HVAC and water systems, lighting, insulation, and health/safety aspects are neither advisable nor cost effective. The building elevations are improperly established and both buildings flood during heavy rains, placing employees at risk of electrocution and injury from slipping and falling. Funding has been obtained through the American Reinvestment and Recovery Act (ARRA) for replacement of the existing office building with a headquarters/visitor contact station to allow for efficient administrative function for fish and wildlife habitat and population management programs and a visitor services program, including opportunities for environmental education and interpretation. Funding also has been approved through ARRA for replacement of the shop building to enable the refuge to have safe and efficient work space to accomplish service and repairs of equipment, other maintenance operations, and also allow suitable storage of valuable equipment to protect these assets from the elements.

The proposed headquarters/visitor contact station would be 1-story, approximately 2,500 square feet in size, would be fully ADA-compliant, and would include a volunteer/receptionist area, exhibit area, conference room, break room, law enforcement storage, public restrooms, staff offices, and public parking. The proposed maintenance shop/equipment storage shed would be an approximately 3,000 square feet structure that would include two enclosed drive-through bays, concrete floors, adequate storage for materials and supplies, vehicle lift, environmentally sound vehicle wash pad, and outdoor equipment storage with an insulated roof.

The existing buildings would be removed and the new structures would be constructed in approximately the same locations within the existing office-shop grounds, thereby minimizing site disturbance and habitat loss. Building design and construction would incorporate energy-conserving features, such as efficient HVAC, lighting, and water systems, and potential alternate energy sources. The existing entrance drives, shop yard, vehicle approaches, and parking areas would be utilized for the replacement facilities.

The visitor contact station would be open to the public during regular business hours. More than 40,000 visitors would use this facility annually. The maintenance shop would provide work area and storage for most of the heavy equipment of the station and would be used by staff, volunteers, YCC, interns, and other authorized persons.

Availability of Resources: The planning/design, engineering, and construction would be funded through ARRA. The new facilities would incorporate energy-conserving features and low maintenance design and components. Annual maintenance and operation needs are expected to remain within the capabilities of the staff and funding levels.

Anticipated Impacts of the Use: Minor, temporary surface disturbance would occur around the construction site. Proper erosion control measures would be implemented and disturbed surfaces would be revegetated following construction. The new buildings would replace the existing ones and would be located within the existing office-shop complex; therefore, no wildlife habitat would be destroyed. Noise and activity around the construction site may temporarily displace some wildlife, such as birds, small mammals, reptiles, and amphibians. Some trampling of vegetation and perhaps small vertebrates and invertebrates may occur, but these losses would be minor. The impacts of these activities would be temporary and not cumulative over the long term. The new buildings would incorporate green-building design and features that would lessen the environmental effects of the operation and use of the facilities.

Determination:

_____ Use is Not Compatible

___X___ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Energy-conserving features wold be incorporated into building design, construction activities would be conducted in such a manner that disturbance to the site and wildlife would be minimized, and safety precautions would be implemented to prevent risk of injury to visitors and staff. The new facilities would be used to enable achievement of refuge purposes and facilitate management programs for the benefit of trust species.

Justification: This project is not new construction but a replacement of existing facilities utilizing existing disturbed sites. Work activities would negligible environmental effects, if any. This project would be completely funded through ARRA and would enable the refuge to better fulfill refuge purposes by facilitating habitat restoration, management, and conservation programs for trust species. Furthermore, the construction and operation of these facilities would promote compatible public uses, including environmental education and interpretation, that would serve to increase public awareness of the need for and value of Big Lake NWR and the Refuge System, and garner support for refuge programs.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

CACHE RIVER NATIONAL WILDLIFE REFUGE COMPATIBILITY DETERMINATIONS

Uses: The following uses were found to be appropriate and evaluated to determine their compatibility with the mission of the National Wildlife Refuge System and the purposes of the refuge.

1. Hunting
2. Fishing
3. Wildlife Observation and Photography
4. Environmental Education and Interpretation
5. Research and Monitoring
6. Forest Products Harvesting
7. Commercial Guiding for Wildlife Observation/Photography
8. Commercial Video and Photography
9. Nuisance Animal Control
10. Cooperative Farming
11. Commercial Fishing
12. Furbearer Trapping
13. Construction of an Environmental Education/Visitor Center

Refuge Name: Cache River National Wildlife Refuge

Date Established: June 16, 1986

Establishing and Acquisition Authority(ies):

"…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. 3901(b) (Emergency Wetlands Resources Act of 1986)

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

"…for use as an inviolate sanctuary, or for any other management purposes, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act).

Refuge Purpose:

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)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)
Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
The Property Clause of the U.S. Constitution Article IV 3, Clause 2
The Commerce Clause of the U.S. Constitution Article 1, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System. March 25, 1996
Title 50, Code of Federal Regulations, Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

NOTE: Compatibility determinations for each use listed were considered independently. However, for brevity within this Appendix, the preceding sections from “Uses” through “Other Applicable Laws, Regulations and Policies” and the succeeding sections, “Literature Cited,” “Public Review,” and the “Approval of Compatibility Determinations” are only provided once for each refuge within this Appendix. However, those sections omitted in this CCP remain as part of each compatibility determination and will be included in any compatibility determination that may be printed separately from the CCP.

1) Description of Use: Hunting

Hunting opportunities on Cache River NWR include the take of squirrel, rabbit, quail, deer, raccoon, opossum, and turkey. Additionally, hunters may take beaver, muskrat, nutria, armadillo, coyote, and feral hog incidental to the hunting of game species listed above. Migratory bird hunting includes waterfowl, doves, snipe, and woodcock. All hunts fall within the framework of the Arkansas Game and Fish Commission (AGFC) open seasons and follow AGFC regulations. There are refuge-specific regulations that supplement and further restrict the AGFC regulations. Refuge-specific regulations are reviewed annually and incorporated into the refuge hunting brochure. All hunters are required to read the refuge brochure and adhere to all regulations contained therein. A hunting permit on the front cover of the brochure must be signed by the hunter and must be carried on his person while hunting on the refuge.

Waterfowl sanctuaries are closed to all public entry and use (including hunting) from November 15 to February 28. Retriever dogs are allowed for waterfowl hunting and dogs also are allowed for hunting other migratory birds, small game, and raccoon/opossum. Hunter access is by foot, motor vehicle, boat, bicycle, or all-terrain vehicle (ATV). All vehicles, including ATVs and bicycles, may only be used on designated roads, trails, and parking areas and are not allowed in fields or other areas. ATV access will be permitted only from September 1 to February 28. Mobility-impaired hunters may apply for a special use permit, allowing specialized access by ATV. Horses/mules are prohibited. Public access to hunt areas may be closed at any time necessary to protect refuge resources or visitors. Possession or use of alcoholic beverages while hunting is prohibited.

Availability of Resources: Adequate resources are available to ensure and administer the proposed activity at its current level of participation. Enforcement of refuge regulations to protect trust resources and provide for a safe, quality recreational opportunity will occur via regular patrols by refuge law enforcement officers. Currently, the refuge has one fulltime officer and one collateral duty officer. Additionally, personnel from the AGFC and various sheriffs' departments will patrol the refuge and assist refuge officers when needed.

Anticipated Impacts of the Use: The incidental taking of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At current and anticipated public use levels for this program, this incidental take would be minor and would not directly or cumulatively impact population levels on the refuge or in the surrounding area. Implementation of a highly effective law enforcement program and continued development of special regulations for this use would eliminate most incidental take or other violations or safety problems.

Based on available information, it is anticipated that the current levels and expected future levels of hunting or other wildlife-dependent recreation activities would not directly, indirectly, or cumulatively impact any listed, proposed, or candidate species. Current known federally endangered species occurring on Cache River NWR are ivory-billed woodpecker, interior least tern, and pink mucket and fat pocketbook mussels. Data gathered from future biological surveys regarding the importance or potential importance of the refuge to threatened or endangered species or critical habitat (or proposed threatened, endangered, or critical habitat) could result in changes to public use activities over time; however, these changes would have no effect on listed species.

Impacts, such as trampling small vertebrates or invertebrates and crushing/trampling of vegetation, would be minimal. Additionally, the activities of hunters traveling to and from hunt areas and their activities while hunting would disturb some non-target wildlife, but these disturbances are temporary, short-term, non-lethal, and not highly repetitive. As a consumptive use, hunting would have some minimal and short-term direct negative impacts on refuge resources. Numbers of resident, as well as migratory, species would be temporarily reduced as animals are harvested, but these individual and collective losses would be compensated by recruitment during the following reproductive season; therefore, no long-term cumulative losses in populations would result.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Hunting is permitted in accordance with AGFC regulations and licensing requirements. Additional refuge-specific regulations further restrict the AGFC regulations. The waterfowl sanctuary is closed to all public entry and use, including hunting, from November 15 to February 28. All vehicle use, including ATVs and bicycles, is restricted to designated roads and parking areas only. Monitor ATV access and modify as needed to mitigate any negative

impacts to refuge habitats, infrastructure, and visitors in compliance with EO 11644 and EO 11989. Monitor use of boats in flooded areas and modify activities if warranted to ensure compatibility. Public access to hunting areas may be closed at any time necessary to protect refuge resources or visitors. Possession or use of alcoholic beverages while hunting is prohibited.

Refuge-specific regulations that pertain specifically to waterfowl hunters include but are not limited to:

- Morning hunting (until 12:00 noon) only.
- Only approved non-toxic shot may be possessed or used.
- Decoys, blinds, boats, and other equipment must be removed daily by 1:00 p.m.
- Cutting of holes or other manipulation of vegetation (i.e., cutting bushes, mowing, weed-eating) or hunting from manipulated areas is prohibited.
- All day hunting permitted for geese (all applicable species) after January closing of the regular duck season through the end of the AGFC conservation season.
- Waterfowl hunters may not enter the refuge earlier than 4:00 a.m. daily.
- Retriever dogs are allowed for waterfowl hunting.
- Commercial waterfowl guiding is not allowed on the refuge.

Refuge-specific regulations that pertain to small game hunting include:

- Spring squirrel season is closed.
- Only approved non-toxic shot or rimfire rifles may be possessed and used for all small game hunting.
- Dogs are allowed for quail hunting.
- Dogs are allowed beginning December 1 for squirrel and rabbit hunting.
- Dogs are required for night hunting of raccoons and opossums.
- Beaver, muskrat, nutria, armadillo, coyote, and feral hog may be taken incidental to any refuge hunt by the use of the device appropriate for that hunt and according to any applicable AGFC regulations.
- The refuge is closed to all other public entry and use (including small game hunting) during the Quota Gun Deer Hunt.

Refuge-specific regulations that pertain to big game hunting include:

- Only portable stands capable of being carried by one person may be used and the owner's name and address must be permanently affixed to the stand.
- Stands may be erected 7 days prior to the refuge deer season and must be removed from the waterfowl sanctuary prior to November 15, and from the rest of the refuge by the last day of archery season.
- For all refuge hunts, the limit is one either-sex deer per hunt except for the archery season in which the statewide bag limit applies.
- Only shotguns with slugs, legal pistols, and muzzleloaders, shooting a single projectile, may be used or possessed during the Quota Gun Deer Hunt on the Dixie Farm Unit Waterfowl Sanctuary and adjacent waterfowl hunting area and the Plunkett Farm Unit Waterfowl Sanctuary.
- The possession or use of buckshot is prohibited.

- The refuge is closed to all other public entry and use, including the hunting of other species, during the Quota Gun Deer Hunt.
- Harvested deer should be checked at a manned refuge check station during the Quota Gun Deer Hunt to allow collection of biological data.

- Spring turkey hunting in Units I and III are same as state season. Unit II is closed with the exception of those refuge lands included in the combined Black Swamp WMA/Cache River NWR quota permit hunts administered by AGFC.
- Fall turkey hunting is restricted to archery hunting only.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, hunting is a priority public use activity that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

2) Description of Use: *Fishing*

Cache River NWR is open to the public for fishing and frogging, and permitted year-round in accordance with Arkansas Game and Fish Commission (AGFC) regulations. Fishing with rod and reel, pole and line, limb line, yo-yo, jug line, trotline, and bow and arrow (on line) is permitted. Fishermen are also permitted to collect crawfish with rakes and/or traps for personal use only. Harvesting of turtles and mussels is prohibited. Access to fishing areas is by motor vehicle, motor boat, canoe, kayak, or walking. All-terrain vehicles (ATVs) are not allowed for this use. Vehicles may only be used on designated roads and parking areas. Waterfowl sanctuaries are closed to all public entry and use (including fishing) from November 15 to February 28.

Commercial fishing is authorized only by special use permit and is covered under a separate compatibility determination.

Availability of Resources: Refuge staff and resources are adequate to cover management of fishing at current levels. However, it is anticipated that an increase in this use may occur over the coming years. In order to provide safe and quality fishing, additional resources and staff will be needed to enhance or develop additional access areas and provide law enforcement. A portion of the refuge's budget is spent annually managing for the benefit of freshwater fisheries, maintaining boat launching ramps, improving access, conducting law enforcement patrols, and ensuring refuge visitors are in accordance with boater safety, and following refuge regulations.

Anticipated Impacts of Use: Fishing and frogging is not expected to have substantial, long-term adverse impacts on fisheries or other wildlife resources at Cache River NWR, including wildlife habitat. Monitoring of frogs will be implemented to gauge trends in numbers and habitat use. The activities associated with fishing and frogging, including travel to and from fishing areas, may cause trampling of vegetation, small invertebrates, and vertebrates; however, these are short-term, relatively minor, and not highly repetitive. Also, fishing is not expected to result in negative indirect or cumulative impacts to refuge resources. As a consumptive use, fishing would have some minimal and short-term direct, localized impacts on refuge resources, including populations of target sport fish.

Fishing is a wholesome, enjoyable, and wildlife-dependent public use opportunity; however, participation in this activity generally results in litter on the refuge (fishing line, food, bait containers, soda/beer cans, and other "trash") that must be removed numerous times per year in order to keep the refuge looking presentable. Trash is detrimental to the aesthetics of the refuge and can impact the digestive tracts of birds, turtles, fish, and other resident and migratory wildlife. The refuge would strive to reduce this problem by working with partners to pick up litter, educating anglers not to litter, and through law enforcement. Information contained in the refuge brochure concerning rules and regulations also helps keep negative impacts to a minimum. Regulations are reviewed annually and modifications are made as necessary to maintain compatibility and to ensure a safe and quality fishing program.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Fishing and frogging are permitted in accordance with AGFC regulations and licensing requirements. Conflicts between fisherman and hunters or other visitors using the refuge for non-consumptive wildlife recreation have not been a problem and are not expected to be a problem in the future. Associated violations, such as taking under-sized fish, open fires, and littering, can be minimized by public outreach and a continued law enforcement presence.

The following stipulations would help ensure the refuge fishing program is compatible with refuge purposes.

- All fishing tackle must be attended at all times.
- Crawfish may be collected for personal use only. All crawfish traps must have the owner's name and address permanently affixed.
- Taking or possessing turtles and mussels is prohibited.
- Only fishing with rod and reel, pole and line, limb line, yo-yo, jug and line, trotline, and bow and arrow (on line) will be allowed; no other methods or tackle will be permitted unless issued under a special use permit.
- Waterfowl sanctuaries are closed to all public entry and use (including fishing and frogging) from November 15 to February 28.
- The refuge is closed to all other entry and public use (including fishing) during the Quota Gun Deer Hunt.
- Personal watercraft (e.g., jet-skis, hover craft, and airboats) is prohibited.
- All-terrain vehicles (ATVs) are not allowed for this use.
- Vehicles may only be used on designated roads or parking areas to provide access for fishing.
- Boats with the owners name and address permanently displayed or valid registration may be left on the refuge from March 1 – October 31.
- Public access to fishing areas may be closed at any time necessary to protect refuge resources or visitor safety.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, fishing is a priority public use activity that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

3) Description of Use: *Wildlife Observation and Photography*

Wildlife observation (viewing) and photography are important public uses at Cache River NWR. Abundant wildlife and convenient access make Cache River NWR a destination for visitors hoping to observe and photograph a variety of wildlife and their habitats. Visitors are especially interested in viewing and photographing waterfowl, shorebirds, other migratory birds, including bald eagles, and resident wildlife such as white-tailed deer, eastern wild turkey, turtles, and raccoons. There are no developed facilities for this use, such as photo blinds or observation platforms, although such facilities are planned for future installment. Access to the refuge is by vehicle, boat, or foot. ATVs are not permitted for this use. All vehicle use is restricted to designated roads and parking areas only, and is not allowed in fields or other areas.

Availability of Resources: Refuge staff and resources are adequate to administer the program at current levels. However, it is anticipated that an increase in these uses will occur over the coming years. In order to provide safe and quality wildlife observation and photography opportunities, additional resources and staff will be needed to enhance or develop additional viewing areas and provide improved facilities and programs.

Anticipated Impacts of Use: The activities of visitors engaging in wildlife observation and photography may result in some potential disturbance to wildlife. Minimal impacts in the form of trampling small vertebrates or invertebrates and vegetation, and littering may also occur. Significant indirect or cumulative adverse impacts to refuge resources are not expected from these activities. The establishment of specified viewing areas and facilities, such as blinds, boardwalks, platforms, towers, and trails, would enhance observation and photography, as well as minimize associated visitor impacts or conflicts with other uses. Plans to provide such facilities are in progress.

Determination (check one below):
_____Use is Not Compatible
___X___Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Public access for specified wildlife observation and photography would be allowed in designated areas only. The waterfowl sanctuary will be seasonally (November 15-February 28) closed to all public entry and use. During the Quota Gun Deer Hunt, the refuge is closed to all public entry and use (including wildlife observation and photography) except by Quota Gun Deer Hunt permit holders. Regulations governing public use are reviewed annually and any necessary modifications are made to ensure refuge resources are protected and visitors can enjoy a safe and quality experience. Wildlife observation and photography uses will be monitored and appropriate management action will be taken to eliminate or reduce associated impacts. Public access to wildlife observation and photography areas or facilities may be

closed at any time necessary to ensure protection of refuge resources and visitor safety. All vehicle use is restricted to designated roads and parking areas only.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, wildlife observation and photography are priority public use activities that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

4) Description of Use: *Environmental Education and Interpretation*

On Cache River NWR, environmental education and interpretation activities are conducted to inform and educate the public and provide an understanding of natural resource values and refuge purposes and the mission of the National Wildlife Refuge System. The environmental education and interpretation program facilities will include visitor contact areas, kiosks, platforms or towers, routes or trails, and other designated public use facilities or access areas. In addition, refuge staff provide off-site environmental education and interpretation services at local events, such as festivals, fishing derbies, school classes, and civic or conservation group meetings. Access is by vehicle, boat, bicycle, or walking. ATVs are not permitted for this use. All vehicles, including bicycles, may only be used on designated roads and parking areas and are not allowed in fields or other areas.

Availability of Resources: Refuge staff and resources are adequate to administer the program at current levels. However, it is anticipated that an increase in these uses will occur over the coming years. In order to provide safe and quality environmental education and interpretation opportunities, additional resources and staff will be needed to develop or provide enhanced programs and interpretive facilities (such as visitor contact stations, observation platforms, interpretive trails, kiosks, and other facilities). Plans are being developed to provide additional or improved facilities as described herein. Additionally, the utilization and development (training) of volunteers may supplement environmental education and interpretation programs.

Anticipated Impacts of Use: Outdoor environmental education and interpretation activities may result in minimal disturbance to wildlife from visitors. It is possible that some small vertebrates, invertebrates, and vegetation could be trampled. Littering may also occur. Significant indirect or direct cumulative adverse impacts to refuge resources are not expected from these activities. Environmental education and interpretation facilities, such as blinds, boardwalks, exhibits, kiosks, platforms, and towers, will be designed and established to minimize potential disturbance to wildlife and impacts to resources.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Environmental education and interpretation activities conducted outdoors should be strategically located to minimize impacts and may need to be rotated or moved periodically. The waterfowl sanctuary will be seasonally (November 15-February 28) closed to all public entry and use. Public access to the refuge may be closed at any time necessary to ensure protection of refuge resources and visitor safety. The refuge is closed to all public entry and use (including environmental education and interpretation) during Quota Gun Deer Hunt, except for Quota Gun Deer Hunt permit holders. Regulations concerning public use are reviewed annually and any necessary modifications are incorporated into refuge brochures or otherwise conveyed to visitors. Environmental education and outreach can be taken into the classroom, incorporated into presentations, and will be used at other forums; these activities will have no deleterious affect on fish and wildlife at the refuge.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, environmental education and interpretation are priority public use activities that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
__X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

5) Description of Use: *Research and Monitoring*

Cache River NWR would allow university students and professors, as well as governmental or non-governmental employees and volunteers, to conduct short- or long-term research and monitoring studies. Such research and monitoring would be conducted in various habitats throughout the refuge and with various species of migratory birds, resident wildlife, and fish. The information collected would provide a better understanding of ecosystem functions and responses to management actions. Research and monitoring results would help managers to evaluate prior management actions, identify adaptive management options, and develop “Best Management Practices.” The knowledge gained through research and monitoring studies would allow more effective management decisions. All research and monitoring project requests would be evaluated on individual project merit and applicability to refuge programs on a project-by-project basis.

Availability of Resources: Resources are adequate to administer research and monitoring activities at the current level. The refuge will seek to establish and/or expand partnerships for continued research and monitoring projects conducted by other organizations on refuge lands.

Anticipated Impacts of Use: There could be some negative impacts from scientific research and monitoring on the refuge. Impacts, such as trampling vegetation, ATV and motorboat use, and temporary disturbance to wildlife, could occur. A small number of individual plants or animals may be collected for further study. These collections would not likely adversely affect refuge plant and animal populations. Removal of plant and animal material from the refuge, as well as the potential to accidentally introduce exotic plants and animals, must be carefully monitored and controlled. Some other impacts from research include: (1) Noise disturbance from helicopter, airplane, motorboat, airboat, truck, car, or ATV that may temporarily disturb and/or displace wildlife; (2) physical presence of people or equipment that may temporarily disturb and/or displace wildlife; (3) ground disturbance from walking on site or the use of equipment; and (4) water disturbance by stirring sediments and causing temporary turbidity from equipment or walking. Despite these impacts, which are short-term, the knowledge gained from carefully considered and properly executed scientifically defensible research and monitoring would provide information and justification to improve management techniques and better meet the needs of trust species, and enable the refuge to better achieve its purposes and the mission of the Refuge System. Research and monitoring activities on the refuge are not expected to indirectly or cumulatively impact refuge resources negatively, even though some minimal short-term and direct impacts may occur.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: All researchers would be required to obtain and possess a special use permit. Individual requests to use specialized equipment, all-terrain vehicles, etc., would be evaluated on a project-by-project basis and specified on each permit. Researchers would periodically be evaluated for compliance with requirements. Periodic progress reports would be required and final copies of all reports and publications would be provided to the refuge. The refuge would not directly supply personnel or equipment unless arrangements were made prior to issuance of the permit. The refuge manager would reserve the right to delegate a staff member to accompany permitee(s) at any time. All plants or animals sampled, collected, or released would be done in a scientifically accepted manner, such as those specified by scientific societies. Examples of these societies include the Society for the Study of Amphibians and Reptiles, the American Society of Mammologists, the American Ornithological Society, the Ichthyologists League, the Entomological Society of America, and the Botanical Society of America. Incidental take and inadvertent trampling of vegetation or wildlife are expected to be minimal and will be addressed with each special use permit request. Given compliance with the restrictions set in each permit, research and monitoring conducted on the refuge is considered to be compatible with the purposes for which the refuge was established.

Justification: Sound research and monitoring programs provide a better understanding of species, habitats, and the environmental communities present on the refuge. Additional research and monitoring is needed to assess management programs used on the refuge and evaluate alternative options. The benefit of additional knowledge will greatly outweigh any short-term disturbance or loss of individual plants or animals that may occur. This activity will provide guidance to management for meeting established purposes, goals, and objectives of the refuge.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

6) Description of Use: *Forest Products Harvesting*

Carry out a comprehensive forest management program on Cache River NWR in accordance with an approved forest management plan. Refuge forest habitats will be evaluated over a 3-year cycle. Prescriptions detailing needed actions will then be drawn up, approved from the Service's Regional Office, and carried out on a yearly basis. It is proposed that select trees be sold, and then removed by commercial operations. The forest habitat may also be manipulated by permitees/staff when commercial sales are not feasible. Only trees needing to be removed in order to improve the forest habitat for wildlife or to restore the integrity of the forested wetlands ecosystem will be taken or manipulated. Special use permits may be issued for firewood cutting (personal use) when there is excess downed wood from silvicultural operations or when roads are widened. Seasonal special use permits may be issued for gathering seed, on a limited basis, when forest seed crops are abundant.

Operations may be conducted throughout the year, but only according to the guidelines detailed in the Forest Habitat Management Plan. Operations may involve numerous individuals using hand tools such as chain saws and heavy equipment such as feller-bunchers, skidders, bulldozers, and log trucks.

Availability of Resources: Some elements of needed resources are already in place, such as the forester's time and salary, and the small amount of time needed by other positions in maintenance, law enforcement, management, and administration. Additional expenses for equipment maintenance, operations, and habitat restoration can be funded out of the refuge's budget. The Forest Habitat Management Plan allows that management will be carried out to the extent of available resources (see Section 3.2; Physical Plant and Equipment Use Requirements for a more detailed description).

Anticipated Impacts of the Use: Timber harvest operations will result in short-term disturbances and long-term benefits to forest habitats. Short-term impacts will include disturbance and displacement of wildlife, vegetation, and soils typical of any heavy equipment operation. Operation of heavy equipment and removal of some vegetation will also result in a short-term increase in soil erosion. Additionally, wildlife species dependent on undisturbed forest habitat will be temporarily displaced. As vegetation is disturbed, other wildlife species may also be temporarily displaced. Over time, these short-term impacts will wane as the effects of improvement treatments develop and the benefits are realized. The refuge is divided into 20 forest compartments; therefore, short-term impacts will be minimized by implementing the proposed actions in only a small percentage of the refuge at any given time.

Firewood cutting and forest seed collecting will result in temporary disturbances. Seeds are gathered by hand and sold to local nurseries that, in turn, grow seedlings. The refuge has a need for seedlings to restore marginal cropland and other open fields. By allowing a limited forest seed harvest, the refuge is ensuring a continued supply of suitable seedlings of local origin for forest restoration. In the past, participation in refuge firewood cutting and hand collecting of forest seeds has been low, and future participation is also expected to be low. The quantity and frequency of firewood cutting and seed

harvesting is not expected to result in significant disturbance, diminish wildlife food resources, or jeopardize wildlife survival. Short-term disturbance to wildlife may occur during these activities, but will be insignificant because of the small scale of the projects. Most of the use will occur in late summer or fall, after ground nesting birds have completed the nesting season. Firewood cutting or seed collecting should not result in short- or long-term impacts that adversely affect the purpose of the refuge or the mission of the National Wildlife Refuge System.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:
See General and Specific Guidelines in the Forest Habitat Management Plan, Appendix 7.10 and 7.11.

7.10 General Conditions Applicable To Timber Harvesting Permits

Subcontractors: Subcontractors or agents may be employed with authorization from the refuge forester.

Safety Requirements: The contractor must perform this contract in a safe manner, observing any necessary safety precautions. The contractor will promptly correct any condition, which, in the opinion of the refuge manager or his authorized representative, endangers the safety of personnel, the public, and/or property during the performance of this contract. Failure to observe this requirement will result in contract termination, with the contractor liable for any such damages that may occur.

Liabilities of the Contractor: The contractor will hold the government and all its representatives harmless from all suits, actions, or claims of any character arising out of the injuries to any person or damage to any property resulting from any neglect in the performance of the services required by this contract, or from any claims arising or recovered under the Workman's Compensation laws or any other law, by-law, ordinance, order or decree, or on account of any other act or omission by the contractor or his employees while carrying on operations under this contract. This responsibility will terminate when suits, actions, or claims have been satisfied.

Insurance Coverage: The contractor must be covered by adequate insurance, as the government will assume no liability whatsoever as a result of the contractor's operations under this contract.

Inspection of Work Site: Before submitting a bid, prospective bidders are urged to personally inspect the site. Arrangements to view may be made by contacting Cache River National Wildlife Refuge, Augusta, Arkansas. Telephone (870) 347-2614.

7.11 Special Conditions Applicable To Timber Harvesting Permits

- A pre-entry conference between the refuge forester and the designated permitee representative will be required before the permitee starts logging operations. The purpose of the pre-entry conference is to be sure that the permitee completely understands what is expected and thus minimizes conflicts.
- All refuge wildlife is protected. All reasonable efforts will be made by the permitee to protect wildlife from harm and harassment.
- All logging will be within the boundaries specified on the attached map.

- Trees will be cut so as to leave ground-level paint spots visible after the tree has been cut. All marked trees are to be cut, with the exception of marked leave trees in shelterwood, seed tree, or small open areas as described in the special use permit.
- Only marked or designated trees will be cut. Care will be taken to protect all other trees and vegetation from damage. Unmarked trees that are cut or injured through carelessness will result in a fine of $5 per inch diameter at stump height or breast height if present.
- Trees and tops will not be left hanging or supported by any other tree and will be laid down immediately after felling.

- Tops and logging debris will be lopped to within 6 feet of the ground in all areas 100 feet or less from major roads.
- All roads, rights-of-way, active agricultural fields, designated openings, ditches, and streams must be kept clear of tops and debris. The permitee is required to repair all damage resulting from operations conducted under this permit.
- The skidding of logs greater than 20 feet in length may be prohibited in designated areas.
- The refuge manager or his authorized representative must approve the location of additional roads. Additional trees removed for roads or loading sites will be marked by the refuge forester and paid for at bid price.
- Loading of forest products on public roads or shoulders or on regeneration areas is prohibited.
- Logging will not be permitted when the ground is wet and subject to rutting and severe compaction. The permitee and his employees will do all in their power to prevent rutting and erosion.
- The permitee and his employees will do all within their power to prevent and suppress forest fires. Fires will be reported immediately to the refuge office.
- Ownership of all products remaining on a sale area will revert back to the government upon termination of the permit.
- Littering in any manner is a violation of the Code of Federal Regulations. The entire work area will be kept free of all litter at all times.
- The possession or use of firearms of other weapons on the refuge is prohibited outside of hunting seasons.
- The government accepts no responsibility to provide rights-of-way over private lands for materials sold under this contract.
- The refuge manager or his authorized representative will have the authority to temporarily close down all or any part of the operation during a period of high fire danger, wet ground conditions, or for any other reason deemed necessary. Additional time, equal to the closing period, will be granted to the permitee.
- The decision of the refuge manager will be final in the interpretation of the regulations and provisions governing the sale, cutting, and removal of the timber products covered by this permit.

Justification: This use has been determined compatible provided the above stipulations are implemented. This use will facilitate the primary purpose of the refuge, which is to provide waterfowl habitat and to conserve other migratory birds and wildlife. This use will meet the mission of the National Wildlife Refuge System and enhances fish, wildlife, and plant resources on these lands by providing renewable resources for the benefit of the American public. This use will be administered in compliance with 50 CFR 29.1.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

7) Description of Use: *Commercial Guiding for Wildlife Observation/Photography*

Allow commercial guiding to facilitate wildlife observation/photography on Cache River NWR. The objective is to provide the opportunity to experience wildlife observation and photography to the segment of the public lacking the knowledge or equipment required to view/photograph fish, wildlife, plants, or their habitats in compliance with the legal mandates of the National Wildlife Refuge System Improvement Act of 1997 concerning compatibility and priority public use. The surrounding communities, including Augusta, McCrory, Brinkley, Des Arc, and Cotton Plant, are dependent on supporting refuge visitors throughout the year. Within these communities, grocery stores, sporting goods stores, restaurants, lodges, and other businesses obtain a large proportion of their annual income from the influx of refuge visitors. Although wildlife observation and photography are involved on guided trips, the commercial nature of guiding activities associated with these uses does not qualify as priority public uses of refuges (Federal Register/Vol.65, No.202/Wednesday, October 18, 2000/Rules and Regulations-Issue 13: Priority Uses, Pages 62471 and 62472). All commercial activities, including guiding of wildlife observers and photographers, are special type uses that may be authorized when they are appropriate and compatible with the purpose of the refuge, the mission of the National Wildlife Refuge System, and can be administered in a way that minimizes conflicts with priority uses and does not hinder the activities of visiting public not using guide services.

Guiding and equipment may involve the use of vehicles, buses, motor boats, paddle boats, canoes, and hiking. Guiding will be allowed only in designated areas and according to conditions specified by the refuge manager. Several miles of refuge roads are also used to access remote sloughs, bayous, and lakes where wildlife observers and photographers may conduct their activities.

Guides will be allowed to operate through issuance of a special use permit, which must be renewed annually. Special conditions are attached and part of the special use permit designed to meet the above objectives and provide liability protection to the government. The annual fee for the special use permit will be $500.

Increased requests for special use permits to conduct wildlife observation and photography guiding on Cache River NWR are expected in the future. These permits will be issued on a first-come, first-serve basis. The refuge reserves the option to limit the number of permits issued as necessary to ensure compatibility. Future special use permit requests for commercial wildlife observation and photography guiding will be reviewed by management and additional steps will be taken, including limiting the number of guides, increasing annual permit fees, designating observation areas, or discontinuing this use entirely, as may be necessary to maintain safe and quality wildlife observation and photography opportunities for all refuge visitors.

Availability of Resources: Adequate funding and staff exist to administer refuge regulations and special use permit conditions at the current level of interest in this activity. An increase in special use permits may not be possible with the current existing staff. Any increase will be reviewed by management to ensure compatibility.

Anticipated Impacts of the Use: Commercial guiding for wildlife observation/photography would increase opportunities for the public to experience wildlife and gain an added appreciation for the value of Cache River NWR and the National Wildlife Refuge System. This use would benefit a diverse set of participants from within and outside this local area. The use also would allow some economic benefit to local communities from refuge visitation. Minor impacts such as short-term and temporary wildlife disturbance could result. In addition, there could be minor trampling of vegetation and small vertebrates and invertebrates. These impacts are not expected to be significant.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: A special use permit is required.

- No special privileges are granted to the permitee other than those stated in the permit. Interfering with any other individual lawfully participating in any authorized activity on the refuge will be grounds for immediate revocation of the permit and for possible legal prosecution.
- The permitee and assistant each must comply with all applicable federal, state, and refuge laws, regulations, and policy.
- A copy of the special use permit must be in the possession of the permitee and assistant while engaged in commercial guiding activities.
- Guided parties are limited to fifteen (15) members and the permitee and his assistant must all stay together as one (1) party on the refuge. Only one (1) party may be guided per day. The permitee must accompany all parties. Any exception to this requirement must be applied for and approved by the refuge manager prior to such event.
- Within one (1) week after the end of the calendar year, the permitee must furnish the refuge manager a written report on the number of individuals taken onto the refuge and fees charged.
- The special use permit may be terminated or revoked at any time without refund to the permitee for non-compliance with any of the terms thereof. Any violation may be grounds for future permit denial.
- The permitee and his/her agents and guests shall save, hold harmless, defend, and indemnify the United States of America, its agents, and employees for loss, damages, or judgments and expenses on account of bodily injury, death or property damage, or claims for bodily injury, death, or property damage of any nature whatsoever, and by whomever made, arising out of the permitee, his/her employees, subcontractors, or agents with respect to conducting activities connected with the special use permit within the lands administered by Cache River NWR.
- Permitee must provide proof of liability insurance ($300,000 each occurrence, $500,000 aggregate) with the U.S. Fish and Wildlife Service named as co-insured prior to issuance of the special use permit.
- All equipment must be removed from the refuge daily.
- The refuge may limit the number of special use permits issued or discontinue issuance entirely in order to ensure appropriateness, compatibility, and safe, quality opportunities for visitors not using guide services.

Justification: Commercial activities can be allowed on refuges when they do not conflict with the provisions of the National Wildlife Refuge System Improvement Act of 1997 and resulting policies and regulations. The special use permit conditions provide adequate regulation of this specialized activity and ensures quality wildlife observation and photography opportunities for all refuge visitors. Commercially guided wildlife observation and photography is a public use that will allow the unskilled or inexperienced participants to enjoy, experience, and learn about native wildlife and habitats in this bottomland hardwood environment. This commercial wildlife observation/photography use is being implemented in compliance with the legal mandates of the National Wildlife Refuge System Improvement Act, including compatibility.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-Year Re-evaluation Date:

8) Description of Use: *Commercial Video and Photography*

Allow commercial video and photography activities on Cache River NWR for the purpose of exposing the public to the refuge and to promote recognition of the diverse wildlife and habitats found there. Over the past several years, the refuge has been contacted as to the possibility of producing commercial audio-visual productions, such as video and still photographs. The refuge provides a variety of natural habitats abundant with wildlife and is an ideal setting for filmmakers. As programs for visitors are promoted, demand for commercial filming on the refuge may increase.

Availability of Resources: Adequate refuge staff and resources are available to administer this activity at the current level.

Anticipated Impacts of Use: Commercially produced video and photography could result in some disturbance to wildlife. Some minimal trampling of vegetation, invertebrates, and small vertebrates may also occur. However, it is anticipated that this disturbance would be minimal, short-term, localized, and not highly repetitive. Commercially produced video and photography activities are not expected to indirectly or cumulatively impact refuge resources negatively.

Determination (check one below):
_____Use is Not Compatible
___X___Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Access for commercially produced video and photography activities would be allowed in designated areas only under a special use permit. Activities would be monitored to document any negative impacts to wildlife; if negative impacts are found, corrective action would be taken to reduce or eliminate these impacts. Access to key observation and photography areas may be closed during adverse weather conditions for protection of infrastructure (e.g., roads and levees) and visitor safety.

Public Law 106-206, signed by the President on May 26, 2000, directed the Secretary of the Interior to require a special use permit and establish a reasonable fee for commercial filming activities on federal lands administered by the Secretary. This law further stated that for still photography neither a special use permit nor a fee is assessed if the activities take place on lands where members of the public are generally allowed. The Secretary may require a special use permit and fee if photographic activities take place at locations where the general public is not allowed or where additional administrative costs are likely.

The Secretary shall not permit any filming, still photography, or other related activity if the Secretary determines:

- There is a likelihood of resource damage;
- There would be an unreasonable disruption of the public's use and enjoyment of the site; or
- That the activity poses health or safety risks to the public.

Further guidance is found in 43 CFR 5.1 and 50 CFR 27.71, which regulate the making of pictures, television productions, or sound tracks on national wildlife refuges.

- A special use permit is required of any party except amateur photographers or bona fide newsreel and news television photographers and soundmen. All other parties must obtain written permission from local officials having administrative responsibility for the area involved.
- The Secretary has determined that no fee will be charged for the making of such motion pictures, television productions, or sound tracks on areas administered by the U.S. Fish and Wildlife Service (Note: this provision is currently under Departmental review).
- A bond shall be furnished, or deposit made in cash or by certified check, in an amount to be set by the official in charge of the area to ensure full compliance with all conditions of the special use permit. Such bond may be refunded to the applicant if all permit requirements are met and no costs to the government are incurred.
- Permission to make a motion picture, television production, or sound track will be granted by the head of the Service or his/her authorized representative at his/her discretion and on acceptance by the applicant of conditions set forth in a special use permit. Applicants must describe the area where filming is requested and the scope of the filming or recording. Dependent upon weather conditions, applicants will state when filming or other production will begin and end.

Other stipulations include:

- Utmost care will be exercised to see that no natural features are injured, and after completion of the work, the area will, as required by the refuge manager, either be cleaned up and restored to its prior condition or left, after cleanup, in a condition satisfactory to the refuge manager.
- Credit will be given to the Department of the Interior and the U.S. Fish and Wildlife Service through the use of an appropriate title or announcement, unless the refuge manager issues a written statement that no such courtesy credit is desired. A copy of the final product will be provided pro bono to the refuge staff.
- Pictures will be taken of wildlife only when such wildlife will be shown in its natural state or under approved management conditions if such wildlife is confined.
- Any special instructions received from refuge manager will be complied with.
- Any additional information relating to the privilege applied for by the applicant will be furnished upon request.
- Other stipulations may be warranted depending upon the proposed location and season of the year the activity is conducted.
- Further guidance on this activity is found in Service Manual 650 FW 5.

The following stipulations apply to special use permits issued for commercially produced video and photography activities. To minimize impacts on refuge lands and resources, the refuge manager will ensure that filmmakers comply with policies, rules, and regulations and will monitor and assess all activities of filmmakers.

- Failure to abide by any part of a special use permit: violation of any refuge-related provision in Titles 43 or 50, Code of Federal Regulations; or any pertinent state regulation (e.g., fish or game violation) will be considered grounds for immediate revocation of the permit and could result in denial of future permit requests for lands administered by the U.S. Fish and Wildlife Service. This provision applies to all persons working under the authority of the permit.
- The permitee is responsible for ensuring that all employees, party members, and any other persons working for the permitee and conducting activities allowed by the special use permit are familiar with and adhere to the conditions of the permit.
- The special use permit may be canceled or revised at any time by the refuge manager for noncompliance or in case of emergency (e.g. public safety, unusual resource problems). The permitee and permitee's clients do not have exclusive use of the site(s) or lands covered by the permit.
- Prior to beginning any activities allowed by the special use permit, the permitee shall provide the refuge with: (1) A copy of current business license; and (2) proof of comprehensive general liability insurance.
- Prior to conducting commercial filming activities, the permitee shall provide the refuge manager with the name and method of contact for the field party chief or supervisor.
- A valid copy of the special use permit, signed by the refuge manager or designee, must be in the party leader's possession at all times while exercising the privileges of the permit.
- Endorsement of the special use permit signifies the permitee's understanding and concurrence with all the conditions set forth in the General Conditions found on the reverse side of the special use permit and the above Special Conditions.

Under the stipulations described above, commercially produced filmmaking, production, or sound track recording is viewed as compatible with the purposes for which the refuge was established.

Justification: Commercial video and photography are economic uses that must contribute to the achievement of refuge purposes or the mission of the National Wildlife Refuge System. The products derived may educate groups of people that may not normally know about the refuge, such as the elderly, handicapped, or urban youth groups. The services provided by commercial filmmakers will be beneficial to extend public appreciation and understanding of wildlife, natural habitats, and the mission of the Refuge System. Conditions imposed in the special use permit of filmmakers ensure that these wildlife-dependent activities can occur without adverse effects to refuge resources or other visitors. The activity will be required to have a primary focus on education and information about refuge purposes and the Refuge System mission.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

9) Description of Use: *Nuisance Animal Control*

This activity would allow a managed and highly targeted program for the take of nuisance animals on Cache River NWR that are harmful to refuge habitat and/or infrastructure critical to refuge habitat management and operations, and therefore a threat to the trust species that inhabit or utilize the refuge. Currently, this program will specifically address beaver, nutria, and feral hogs, but may be expanded to other species, if necessary, and in compliance with Arkansas Game and Fish Commission (AGFC) regulations, to address future harmful impacts caused by exotic or invasive species and prevent or control problems, such as disease outbreaks involving furbearers or excessive predation on trust species.

Semi-aquatic Component
The hydrology and habitat of the refuge is such that semi-aquatic animals, specifically, beaver (*Castor canadensis*) and nutria (*Myocastor coypus*), have become prolific and their dense populations have degraded habitat for other wildlife usage.

Beaver naturally impound water to enhance accessibility and extend usable habitat beyond the stream channel. Under normal hydrologic and population conditions, beavers are held in check by availability of water and natural predators, and under these conditions their impoundments may provide beneficial aquatic microhabitats containing scrub-shrub vegetation and trees. However, the amount of irrigated cropland on the refuge provides beavers with a “dry” season water supply from irrigation runoff. Beaver and nutria have little pressure from natural predators. Beaver populations have grown to the point that impoundments have been rebuilt for many years and impounded areas have grown in size. Over the long-term, these impoundments degrade the habitat both within and surrounding the area, because the woody vegetation within the impoundments decreases in diversity and abundance, and trees eventually will be excluded altogether. The water table surrounding the impoundment is elevated, altering the forest species composition and degrading quality and health. The hydrology itself is impacted as sediment and organic material from decomposing aquatic vegetation accumulates in the impoundment and impedes the ability of the site to dewater. Additionally, water quality in impounded areas is negatively affected due to increased water temperature and turbidity and decreased dissolved oxygen, and reduced species diversity.

Nutria are non-native herbivores that cause negative impacts on wildlife habitat by consuming and destroying aquatic vegetation, and burrowing in levees of migratory bird impoundments. Their constant burrowing causes roads and levees to collapse, which ultimately poses a major safety issue for refuge personnel and visitors. These activities degrade habitat managed for waterfowl, shorebirds, and other desired species. Their foraging activities also result in competition with waterfowl for food resources.

Refuge staff remove beaver impoundments annually and opportunistically, and conduct wintertime trapping and shooting, but do not have resources to consistently and effectively pursue sufficient control to protect the habitat resources from beaver and nutria impacts.

Terrestrial Component
The presence of feral hogs (*Sus scrofa*) has been documented on the refuge and observed on several occasions in the recent past. The animals are not native and have few natural predators. The hogs compete with resident wildlife for forage, which includes herbaceous vegetation, roots, acorns, invertebrates, and mammals. Additionally, the animals degrade habitat by rooting and digging wallows. Hardwood plantings used to restore marginal agricultural lands to productive, forested wildlife habitat are threatened by these animals. Also, there is the potential for the feral hog to carry and transmit a number of infectious diseases to resident wildlife and humans. Currently, the refuge allows the take of feral hogs during any legal refuge hunt, but the staff has implemented no

further control measures. Similar to the beaver and nutria problem, the refuge does not have the resources to pursue sufficient control to protect the habitat and wildlife from this threat.

Permit System
As necessary to protect refuge resources, the staff may issue special use permits to individuals for the take of nuisance beaver, nutria, and feral hogs. Special use permits may be issued refuge-wide, or permitees may be directed to certain areas with known overpopulation or habitat damage issues. The take may consist of trapping, shooting, or other methods approved by the AGFC, and the permitee will be allowed to retain the animals, pelts, tails, and any bounties from animals taken under the special use permit. Because there are advantages to trapping or shooting in virtually all seasons, permits will be valid year-round, unless otherwise specified in the permit, or specified later by the refuge manager. In the case of feral hogs, control measures will be limited to shooting and/or live trapping. Captured animals will be dispatched by gunshot.
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Availability of Resources: Refuge staff and resources are adequate to administer this program. The expenditures for issuing special use permits, oversight, and enforcement will be minimal. To closely monitor the program and to protect non-target animals, the refuge may issue only a small number of permits annually.

Anticipated Impacts of Use: The take of nuisance animals will involve the use of vehicles, boats, ATVs, walking in approved areas, setting of traps or snares, and discharge of firearms, which will result in only normal short-term disturbances similar to those associated with other refuge approved uses (e.g., hunting, fishing, birding).

With respect to beavers and nutria, the short-term benefits of this program should result in decreased nuisance animal populations and reduced inundation of refuge habitats and damage to infrastructure. As nuisance animal populations decrease, the number, size, and frequency of rebuilt beaver impoundments should also decrease. The refuge will spend less time and expense on the removal of impoundments and can redirect these resources to other habitat restoration and management activities. Damage to infrastructure and habitat should be reduced. In the long-term, degraded habitats will return to a more normal hydrologic regime and will be reclaimed by native hardwoods and natural riparian vegetation, which will result in increased benefits to trust resources and associated wildlife-dependent recreation.

With respect to feral hogs, the short-term benefits of this program should be realized in re-growth and/or recovery of hardwood plantations, and other young plant communities and soils that were formerly disturbed. In addition, local wildlife populations will have relief from this non-native competitor/predator. In the long-term, a reduction in feral hog numbers and associated damage and disease potential will result in enhanced conditions for trust resources and associated wildlife-dependent recreation.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:
- The use will be administered under conditions of a special use permit issued by the refuge manager that will enable control efforts to be directed to problem areas and specify methods and procedures to ensure protection of staff, visitors, and refuge resources.
- Use will be conducted to minimize risk of injury or take of non-target species and disturbance to refuge habitats.

- Use will be conducted to avoid any conflicts with refuge visitors.
- Permitee will comply with all applicable state and federal regulations.
- Activities under this special use permit will not be conducted in waterfowl sanctuaries during annual closure periods.
- Permitee will provide locations of beaver dams and lodges and other problem areas, as well as number and location of species taken.
- All target animals will be immediately dispatched by gunshot.
- The permitee and his/her agents and guests shall save, hold harmless, defend, and indemnify the United States of America, its agents and employees, for loss, damages, judgments, and expenses on account of bodily injury, death, or property damage, or claims for bodily injury, death, or property damage of any nature whatsoever, and by whomever made, arising out of the permitee, his/her employees, subcontractors, or agents, with respect to conducting activities connected with the special use permit within the lands administered by the refuge.
- The special use permit may be revoked at any time by the refuge manager.
- The refuge manager may discontinue the use at any time.

Justification: This use has been determined compatible provided the above stipulations are implemented. This use will facilitate the primary purpose of the refuge, which is to provide waterfowl habitat and to conserve other migratory birds and wildlife. This use will meet the mission of the National Wildlife Refuge System by conserving fish, wildlife, and plant resources on these lands and by providing renewable resources for the benefit of the American public. This use will be administered in compliance with 50 CFR 29.1 and EO 13112.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

10) Description of Use: *Cooperative Farming*

Cache River NWR has utilized agricultural practices as a means of waterfowl management from the beginning of the refuge's establishment in 1986. The refuge utilizes cooperative agreements signed with local farmers annually to fulfill the refuge's purposes. Farming will be conducted on a crop-share basis, with the farmer providing the equipment, seed, fertilizer, pesticides, and labor, while the refuge provides the land base. The refuge has two distinct farm units encompassing, about 3,106 acres in Prairie and Woodruff Counties. The Dixie Farm Unit, which lies in Woodruff County, maintains approximately 2,363.2 acres of cropland. The Plunkett Farm Unit, which lies in Prairie County, maintains approximately 742 acres of cropland. Cooperators are required to adhere to all refuge regulations and provide all necessary documentation, while performing agricultural practices on refuge property. It should be noted that the acreage on these two farm units is also utilized to meet refuge objectives for moist-soil plant production, winter browse, and migrating shorebird habitat in addition to row crop objectives for the refuge.

Availability of Resources: The refuge does not have the staff or the funds to accomplish this critical habitat management program internally. Food production goals are accomplished through a cooperate agreement with a local farmer. Refuge staffing levels are adequate to administer the program through this cooperate arrangement.

Anticipated Impacts of Use:

- Food is produced to help meet refuge purposes and goals (high-energy foods to maintain body condition and health of migrating and wintering waterfowl, wading birds, and shorebirds).
- Partial restoration of hydrology on a portion of cropland acres.
- Increased habitat diversity due to inclusion of moist-soil management, addition of buffer strips, restoration of forested corridors, shorebird units management, and wading bird habitat.
- Increased numbers and diversity of waterfowl and other migratory birds using refuge habitats for wintering, staging, and migrating.
- Minor soil erosion impacts even though soil conservation measures are employed.

Determination (check one below):

_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The following stipulations would help ensure the refuge cooperative farming program is compatible with refuge purposes:

- The cooperative farmer may begin farming operations March 1. Farm field access after November 15 will be limited to that necessary to remove equipment or other necessary trips.
- The cooperator will participate in Farm Service Agency programs to extent possible to protect crop bases. All acreage reporting will be the responsibility of the cooperator, with final certification by refuge manager.
- Land alterations including, but not limited to, ditching, land leveling, filling, clearing, and mowing will be done only upon approval of refuge manager. No drainage of fields will be permitted prior to March 1 of each year.
- All crops shall be harvested as early as possible, with a target date for completion of harvesting operations of November 1. Refuge crops will be fertilized at the same rate as cooperator's and receive every other similar treatment (pesticides, tillage, etc.).
- The refuge's share of the crop will be left in the field. The refuge will receive 1/4 of rice acres planted as its share, anytime rice is planted. The refuge's rice share or an equal amount of acreage designated by the refuge manager will be flooded by the cooperator at the cooperator’s expense by November 1, and maintained in a flooded condition by pumping through November 30.
- All cooperator rice fields shall be rolled after harvest and irrigation levees will be rebutted to hold rainfall. This practice shall be accomplished by November 1.
- Any set aside acreage will be planted to Farm Service Agency approved crop or managed for production of moist-soil plants as requested by refuge manager rather than be clean disked throughout the year.
- Only approved chemicals (pesticides) may be used on crops. Approved post-emergence chemicals will only be used after professional crop scouting results indicate that pest density is at, or beyond, the economic threshold level. Chemical application on any other vegetation is prohibited. Pesticide application instructions will be adhered to and efforts will be made by the cooperator to reduce use of chemicals through alternative non-chemical pest control techniques. The cooperator will keep accurate records of pesticide application and furnish a written copy to the refuge manager by December 1.

- The cooperator will abide by all appropriate state and federal regulations pertaining to storage, use, and disposal of hazardous materials (oils, solvents, pesticides, etc.). The cooperator will immediately notify the refuge manager in event of any accidental hazardous materials release and take appropriate measures to contain the release.
- No fall disking is allowed without prior approval from the refuge manager. Any acreage disked in the fall will require a winter cover crop.
- All refuge crop share fields and cooperator harvested fields will be left standing and not manipulated in anyway, unless specifically directed to do so by the refuge manager.
- Firearms are not permitted on the refuge and will not be used as a scare device. All refuge regulations will be adhered to.
- No burning of any kind is allowed on the refuge.
- The cooperator will leave all refuge boundary signs in existing locations. Any refuge boundary signs destroyed, as a result of the cooperator's operations, shall be replaced by the cooperator.
- The cooperator shall report surface and groundwater usage annually to county NRCS office and pay reporting fees.
- The Service reserves the right to install pipes and water control structures and construct levees, which may spot damage or destroy cooperator's crops.
- Equipment stored on Service property will be allowed only to the extent used to farm the refuge. Surplus, non-operational, or salvaged equipment will be immediately removed. Miscellaneous farm scrap, such as old tires, old rice levee gates, and old irrigation pipes, will be removed from the refuge. Failure to comply will result in removal at the cooperators expense.
- Soil testing on all fields should be accomplished once every 3 years to increase farm efficiency and conservation. Soil samples can be submitted to the local agricultural extension office at no cost to the farmer. A copy will be provided to the refuge manager.
- The refuge manager/staff will conduct several site inspections of the farm facilities throughout the year to assure compliance. These site inspections will be signed by the refuge manager and cooperator to illustrate understanding and compliance.
- The cooperator will be responsible for maintaining and repair of all wells, pumps, and all associated devices used for irrigations purposes.
- The cooperator and their agents and guests shall save, hold harmless, defend, and indemnify the United States of America, its agents, and employees for loss, damages, or judgments and expenses on account of bodily injury, death or property damage, or claims for bodily injury, death, or property damage of any nature whatsoever, and by whomever made, arising out of the cooperator, his employees, subcontractors, or agents with respect to conducting activities connected with this agreement within the lands administered by Cache River National Wildlife Refuge.

Justification:
Agricultural crops are needed to meet the migratory waterfowl needs identified through approved Lower Mississippi Valley Joint Venture and North American Waterfowl Management Plans. Soil disturbance and crop rotation that result from refuge crop management allow the production and management of moist-soil vegetation, which is a valuable waterfowl food source and adds an element of habitat diversity. Cropland management is a necessary mechanism to keep some open land tracts from succeeding until they can be restored by planting seedlings of bottomland hardwood species. The refuge lacks personnel, funds, and equipment required to farm cropland by force account. This use will be administered in compliance with 50 CFR 29.1.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

11) Description of Use: *Commercial Fishing*

Allow commercial fishing by special use permit on specified areas of Cache River NWR for the benefit of priority fish species and their habitats. Fishing will conform to Arkansas Game and Fish Commission regulations. All refuge waters except sanctuaries are open February 1 – May 1, the Cache River and all lakes, bays, and all bodies of water accessible by boat are open May 1 – October 31, Cache River main channel open November 1 – January 31.

Commercial fishing is utilized to remove fish commonly known as rough fish from refuge waters. The species permitted for commercial harvest include German carp, silver carp, big head carp, grass carp, black carp, buffalo, and catfish. The five carp species are exotics, which as a group, compete with and negatively impact habitat of native fisheries within the refuge and ecosystem. The overly abundant native buffalo, and to a lesser degree, catfish also compete with other native fisheries.

Availability of Resources: Refuge staff and resources are adequate to cover management of fishing at current levels. However, it is anticipated that an increase in this use may occur over the coming years. In order to provide safe and quality fishing, additional resources and staff will be needed to enhance or develop additional access areas and provide law enforcement. A portion of the refuge's budget is spent annually managing for the benefit of freshwater fisheries, maintaining boat launching ramps, improving access, conducting law enforcement patrols, and ensuring refuge visitors are in compliance with boater safety and refuge regulations.

Anticipated Impacts of Use: The primary impact is the removal of exotic, non-game fish. The program involves reducing numbers of these fishes (because eradication is not feasible) and reducing negative impacts to aquatic habitats and certain sport fishes. Incidental take of sport fish may occur in association with this use, but is not expected to result in any long-term or cumulative negative impacts. There is no long-term adverse impact to habitat or native fish and wildlife. Commercial harvest of non-game fish should enhance water quality and survival of other fish species, and provide local economic benefit.

Determination (check one below):
_____Use is Not Compatible
___X___Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Law enforcement officers would ensure compatibility through routine law enforcement patrols enforcing state and refuge-specific regulations. Arkansas Game and Fish Commission officers also occasionally patrol refuge waters and monitor the access areas. A special regulation for the refuge has been initiated to ensure minimal disturbance to migrating waterfowl through closure of waterfowl sanctuaries November 15 – February 28. Turtle trapping is not permitted.

Justification: One of the primary objectives of the National Wildlife Refuge System is to remove exotics from refuges and to restore historic native populations. Removal of exotics and a reduction in rough fish population by commercial harvest is a management practice aimed at reducing adverse impacts to water quality and aquatic habitats. Bottom feeders, such as carp and buffalo, stir up sediments which exacerbates turbidity and impacts fish nesting and spawning habitat for other fishes. Fishery biologists with the Service have long recommended commercial harvest of these species to refuge managers as a management tool with the objective to increase/restore native fish populations on refuges. Commercial harvest of these species is considered a management economic activity that will result in removing exotics, improving quality of aquatic habitats, favorably impacting recreational fishing opportunities, and providing economic benefits to the local community. This use will be administered in compliance with 50 CFR 29.1.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

12) Description of Use: *Furbearer Trapping*

Regulated trapping of furbearers would be allowed on Cache River NWR under an annual special use permit. Regulated trapping is considered a refuge management economic activity. Furbearer species (as defined by the Arkansas Game and Fish Commission) include: badger, beaver, bobcat, coyote, grey fox, red fox, mink, muskrat, nutria, opossum, raccoon, river otter, spotted skunk, striped skunk, and weasel. Trappers would be required to maintain records of all trapping activities and captures as a condition of the permit. This information will be recorded on a Refuge Trapper Report and provided to the refuge at the close of each special use permit term. Trapping would be conducted in accordance with Arkansas Game and Fish Commission regulations, and permitted from December 1 through February 28. Access to trapping areas will involve the use of boat, motor vehicle, ATV, and foot travel on approved roads and trails.

Availability of Resources: Trappers would provide the necessary equipment and resources to carry out the program. Costs to the refuge will be minimal for issuing permits, oversight, and law enforcement. No additional fiscal resources are needed to conduct this use. In fact, this use should result in reduced operational costs to the refuge attributed to nuisance animal control and associated damage to refuge infrastructure.

Anticipated Impacts of Use: Setting and checking of traps/snares would result in only normal short-term disturbances similar to those associated with other refuge approved uses (e.g., hunting, fishing, and birding). Temporary displacement of waterfowl, other migratory birds, and some resident wildlife will occur in localized, specific areas in which trapping occurs and along routes of ingress/egress. Some trampling of vegetation and small vertebrates and invertebrates could occur. The occasional take of non-target species likely will result and must be reported on the Refuge Trapper Report. These impacts are not expected to result in any significant or cumulative negative impacts. Conflicts between trappers and other refuge users are expected to be minimal.

Animals taken by trappers would serve as a positive population control measure, thus assisting in habitat protection, reducing damage to refuge infrastructure critical to performing habitat management for trust species, preventing disease outbreaks associated with high furbearer population levels, and reducing excessive predation of certain priority bird species. Regulated trapping by the public supplements nuisance animal control activities on the refuge and assists in maintaining these animals at acceptable population levels. Control of beaver populations will help ensure protection of important bottomland hardwood forests, including reforestation areas, and minimize beaver damming problems associated with the operation of more than 36 water control structures and associated culverts/drainage ditches necessary for management of habitat for trust species. As beaver numbers decrease, the number, size, and frequency of impoundments that are rebuilt should also decrease. The refuge should spend less time and money on the removal of impoundments/dams and repairing water control structure, roads, and levees.

Over the long-term, the habitats degraded by the animals (specifically, beaver, nutria, and muskrat) will return to a more normal hydrologic regime and be reclaimed by native hardwoods and natural riparian vegetation. Nest success by resident/migratory avian species would likely increase as the population density of nest-predating (e.g. raccoon, opossum, mink, skunk) species decreased. Overall health of refuge wildlife, staff, and visitors will be promoted by prevention of or reduction in severity of disease outbreaks. Local economic benefit will accrue to participants in this program and the refuge has the potential to collect information on wildlife habitat use trends, wildlife sightings, habitat/infrastructure damage, nuisance animal activities, and species interactions.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- All trapping activities require a special use permit; permits are nontransferable. Trappers must carry in their possession the required state licenses and a copy of the permit while engaged in any trapping activities on the refuge.
- Trappers must meet all Arkansas Game and Fish Commission license requirements and comply with all subject regulations (as defined in Arkansas Hunting Guidebook, Furbearer Trapping section), unless exempted by conditions in the special use permit.
- The refuge will allow regulated trapping December 1 through January 31. Only the trapping of species designated as furbearers by the Arkansas Game and Fish Commission may be trapped under the special use permit.
- Waterfowl sanctuaries are closed to all public entry and use, including trapping.
- Traps must be checked daily (within every 24 hours).
- No live furbearers may be removed from the refuge; any furbearers captured in non-lethal sets must be humanely dispatched by the trapper immediately upon discovery.
- Every effort will be made to prevent the capture of non-target species and any caught will be immediately released, if not seriously injured. Any non-target species caught that are not able to be released shall be immediately taken to the refuge office or a law enforcement officer. A refuge officer will be immediately contacted to assist in the release of a black bear or bald eagle caught in a trap, if the trapper is unable to release the animal.
- During refuge hunting seasons, trappers may possess firearms legal for the hunt.
- Use of all motorized vehicles, including ATVs, must be in compliance with all refuge regulations and used only on designated roads.

- Permitee is required to submit a completed Refuge Trapper Report to the refuge manager via certified mail or in person at the refuge office within 30 days of the close of the refuge trapping season. Report forms MUST be submitted whether or not any trapping was conducted or any animals were captured. **NOTE:** *Failure to submit this report will be grounds for denial of a refuge trapping permit for the following season.*
- Failure of a permitee to comply with any of these special conditions or with any applicable federal or state law or regulation may be sufficient cause for cancellation of the special use permit and/or refusal of future refuge trapping permits or any other use or privilege on the Cache River NWR for which a special use permit is required. The permit may be revoked or suspended by the refuge manager for just cause, such as a violation, non-compliance with permit conditions, or nonuse.
- The permitee and his/her agents and guests shall save, hold harmless, defend, and indemnify the United States of America, its agents, and employees for loss, damages, or judgments and expenses on account of bodily injury, death or property damage, or claims for bodily injury, death, or property damage of any nature whatsoever, and by whomever made, arising out of the permitee, employees, subcontractors, or agents with respect to conducting activities connected with the special use permit within the lands administered by Cache River NWR.

Justification: Regulated trapping of furbearers is a biologically sound management tool and legitimate wildlife-dependent activity with a longstanding tradition in the United States. This activity, as defined in this compatibility determination and by the conditions of the applicable special use permit, is compatible with the purposes for which the refuge was established, provides a scientifically accepted tool for wildlife population control, habitat management and protection, and wildlife-dependent recreational activity. Additionally, implementation of a regulated trapping program on the refuge affords a mechanism for collection of surveying and monitoring information; and could contribute to research on furbearer (and other wildlife) occurrence, activity, movement, population status, and ecology.

This use has been determined compatible provided the above stipulations are implemented. This use will facilitate the primary purposes of the refuge to provide waterfowl habitat, and to conserve other migratory birds and wildlife and will contribute to the mission of the National Wildlife Refuge System and provide renewable resources for the benefit of the American public, while conserving fish, wildlife, and plant resources on these lands. The refuge reserves the option to modify, limit, or discontinue this use at any time to ensure compatibility, maintain a safe and quality recreational environment for refuge visitors, or to resolve associated law enforcement problems. This use will be administered in compliance with 50 CFR 29.1 and EO 13112.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

13) Description of Use: *Construction of an Environmental Education/Visitor Center at Cache River NWR*

The current office at Cache River NWR, located about 5 miles south of Gregory, Arkansas, in Woodruff County, is a renovated 1960s ranch house that is not fully accessible. It is inadequate to meet administrative and visitor services needs. Staff entry points, interior workspaces, and restrooms are not fully accessible. Exterior and interior walls are deteriorating and failing, the roof is irreparably leaking and needs to be replaced, the HVAC system is inefficient, rooms are not sufficiently lighted or ventilated, health and safety issues exist, there is a mold problem, and it is infested with rodents and insects. Furthermore, there are no suitable spaces for staff/partners meetings, visitor reception, public meetings, exhibit areas for education/interpretation, or secure storage. Extensive rehabilitation or renovations to correct these deficiencies are not cost effective or desirable.

The proposed facility, an environmental education/visitor center would be approximately 3,500 to 4,500 square feet in size, and would include conference room, auditorium, environmental classrooms, exhibit and display areas, break room, staff and public restrooms, staff offices, secure law enforcement storage, utility/storage closets, fax/photocopy/file rooms, mudroom, bookstore, Friends Group office, and volunteer/receptionist office. This facility would be fully ADA-compliant, would provide adequate administrative function, and would enable suitable opportunities for visitor reception, environmental education, interpretation, and public meetings. The building design would incorporate greening features, including energy-conserving lighting, HVAC and insulative qualities, water-conserving systems, and alternate energy. The building would be designed and constructed to reduce its carbon footprint and lessen environmental impacts, and also would provide a safe and comfortable environment for staff and visitors. Additionally, there would be sites for interpretive foot trails, wayside exhibits, and outdoor kiosks.

The new environmental education/visitor center would be sited within approximately 5 miles of I-40 on existing or newly acquired refuge lands accessed from either the Brinkley or Biscoe exits, on refuge lands accessible from Highway 64 near Augusta/McCrory, Arkansas, or in the current location at Dixie, Arkansas, whichever area is assessed to be the most feasible, practical, and desirable. The current office and maintenance buildings would be retained for operational purposes, unless the Dixie site is selected for the new facility, then the current office building would be removed and full administrative capabilities would be incorporated into the design. Project funding would include planning/design, engineering, construction, furniture, interpretive exhibits, landscaping, and parking areas.

Availability of Resources: Although funding is not currently available to construct a facility that would adequately meet the needs of the public and the staff, a project for a combined office and environmental education/visitor center is in the Region's 5-year construction plan for a project, estimated to cost approximately $4 to $6 million. The new facility would incorporate energy-conserving features and low maintenance design and components. Annual maintenance and operations needs are expected to remain within the capabilities of the staff and funding levels.

Anticipated Impacts of the Use: Permanent surface disturbance and vegetation destruction around the construction site would occur. Proper erosion control measures would be implemented and disturbed surfaces upon which infrastructure are not located would be revegetated following construction. Except for the existing headquarters site, some wildlife habitat destruction would occur in order to prepare the selected site for construction, but is not expected to significantly affect any fish or wildlife populations. No threatened or endangered species would be affected. Noise and activity around the construction site may temporarily displace some wildlife, such as birds, small mammals, reptiles, and amphibians. Some additional trampling of vegetation and perhaps small vertebrates and invertebrates may occur, but these losses will be minor. Except for impacts occurring on the actual

building site, the impacts of construction activities would be temporary and not cumulative over the long term. The new building would incorporate green-building design and features that would lessen the environmental effects of the operation and use of the facilities. The public would use the facility on a daily basis, and such use associated with vehicular and pedestrian ingress and egress would create disturbance for wildlife, but it is expected that wildlife would adapt and become accustomed to the use, and impacts would not be cumulative in the long term.

Determination:

_____ Use is Not Compatible

___X___ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Energy-conserving features would be incorporated into building design, construction activities would be conducted in such a manner that disturbance to the site, habitat, and wildlife would be minimized, and safety precautions would be implemented to prevent risk of injury to visitors and staff. The new facilities would be used to enable achievement of the refuge purposes and facilitate management programs for the benefit of trust species.

Justification: This use would enable the refuge to better achieve refuge purposes, vision, and goals by promoting compatible public uses, especially environmental education and interpretation, which would serve to increase public awareness of the need for and value of Cache River NWR, the Central Arkansas NWR Complex, the Refuge System, and the Service. Such awareness and appreciation by the public would promote support for refuge programs and the mission of the Refuge System and the Service.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

WAPANOCCA NATIONAL WILDLIFE REFUGE COMPATIBILITY DETERMINATIONS

Uses: The following uses were found to be appropriate and evaluated to determine their compatibility with the mission of the National Wildlife Refuge System and the purposes of the refuge.

1. Hunting
2. Fishing
3. Wildlife Observation and Photography
4. Environmental Education and Interpretation
5. Research and Monitoring
6. Forest Products Harvesting
7. Commercial Guiding for Wildlife Observation/Photography
8. Commercial Video and Photography
9. Nuisance Animal Control
10. Cooperative Farming
11. Commercial Fishing
12. Construction of Headquarters/Visitor Contact Station

Refuge Name: Wapanocca National Wildlife Refuge

Date Established: January 24, 1961

Establishing and Acquisition Authority:

"…for use as an inviolate sanctuary, or for any other management purposes, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act).

Refuge Purpose:

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)
Land and Water Conservation Fund Act of 1965

National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)
Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
The Property Clause of the U.S. Constitution Article IV 3, Clause 2
The Commerce Clause of the U.S. Constitution Article 1, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System. March 25, 1996
Title 50, Code of Federal Regulations, Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

NOTE: Compatibility determinations for each use listed were considered independently. However, for brevity within this Appendix, the preceding sections from “Uses” through “Other Applicable Laws, Regulations and Policies” and the succeeding sections, “Literature Cited,” “Public Review,” and the “Approval of Compatibility Determinations” are only provided once for each refuge within this Appendix. However, those sections omitted in this CCP remain as part of each compatibility determination and will be included in any compatibility determination that may be printed separately from the CCP.

1) Description of Use: *Hunting*

Hunting opportunities on Wapanocca NWR include the take of squirrel, rabbit, deer, raccoon, and opossum. Additionally, hunters may take beaver, muskrat, nutria, armadillo, coyote, and feral hog incidental to the hunting of game species listed above. Migratory bird hunting on the refuge is allowed only for snow geese, after February 28 until the end of the State Conservation Order; hunting is allowed north of Ditch 8 only. Migratory bird hunting is not allowed on Round Pond Unit. All hunts fall within the framework of the Arkansas Game and Fish Commission (AGFC) open seasons and follow AGFC regulations. There are refuge-specific regulations that supplement and further restrict the AGFC regulations. Refuge-specific regulations are reviewed annually and incorporated into the refuge hunting brochure. All hunters are required to read the refuge brochure and adhere to all regulations contained therein. A hunting permit on the front cover of the brochure must be signed by the hunter and must be carried on his person while hunting on the refuge.

A waterfowl sanctuary established on Wapanocca Lake and all refuge lands East of Ditch 8, is closed to all public entry and use (including hunting) from December 1 to February 28. Dogs are allowed for squirrel, rabbit, raccoon, and opossum hunting. Hunter access to hunt areas is by motor vehicle, boat, bicycle, or foot. All vehicles, including bicycles, may only be used on designated roads and parking areas and are not allowed in fields or other areas. Mobility-impaired hunters may apply for a special use permit, allowing specialized access by ATV.

Availability of Resources: Adequate resources are available to ensure and administer the proposed activity at its current level of participation. Enforcement of refuge regulations to protect trust resources and provide for a safe, quality recreational opportunity will occur via regular patrols by refuge law enforcement officers. Additionally, personnel from the AGFC and the Crittenden County Sheriff's Department will patrol the refuge and assist refuge officers when needed.

Anticipated Impacts of Use: The incidental taking of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At current and anticipated public use levels for this program, this incidental take would be minor and would not directly or cumulatively impact population levels on the refuge or in the surrounding area. Implementation of a highly effective law enforcement program and continued development of special regulations for this use would eliminate most incidental take or other violations or safety problems.

Currently, the refuge does not have any known threatened or endangered species. Impacts, such as trampling small vertebrates or invertebrates, and crushing/trampling of vegetation, would be minimal. Additionally, the activities of hunters traveling to and from hunt areas and their activities while hunting would disturb some non-target wildlife, but these disturbances are temporary, short-term, non-lethal, and not highly repetitive. As a consumptive use, hunting would have some minimal and short-term direct negative impacts on refuge resources. Numbers of resident, as well as migratory, species would be temporarily reduced as animals are harvested, but these individual and collective losses would be compensated by recruitment during the following reproductive season; therefore, no long-term cumulative losses in populations would result.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Hunting is permitted in accordance with AGFC regulations and licensing requirements. Additional refuge-specific regulations further restrict the AGFC regulations. The waterfowl sanctuary (Wapanocca Lake and refuge lands north of Ditch 8) is closed to all public entry and use, including hunting, from December 1 to February 28. Monitor use of boats in flooded areas and modify activities if warranted to ensure compatibility. Possession or use of alcoholic beverages while hunting is prohibited. Public access to hunting areas may be closed at any time necessary to protect refuge resources or visitors.

Refuge-specific regulations that pertain specifically to waterfowl hunters include, but are not limited to:

- The refuge is closed to waterfowl hunting, except for snow geese, for which hunting is allowed after February 28 until the end of the State Conservation Order, according to applicable federal and state regulation. Hunting is allowed on refuge lands north of Ditch 8 only.
- Retriever dogs are allowed.
- Migratory bird hunting is not allowed on Round Pond Unit.

Refuge-specific regulations that pertain to small game hunting include:

- Dogs are allowed for squirrel and rabbit hunting.
- Dogs are required for night hunting of raccoons and opossums.
- Beaver, muskrat, nutria, armadillo, coyote, and feral hog may be taken incidental to any refuge hunt by the use of the device appropriate for that hunt and according to any applicable AGFC regulations.

Refuge-specific regulations that pertain to big game hunting include:

- Harvested deer must be recorded at the self-checking station located at the refuge headquarters and the proper hunting zone must be recorded.
- Only portable stands capable of being carried by one person may be used and the owner's name and address must be permanently affixed to the stand.
- Stands may be erected 7 days prior to the refuge deer season and must be removed from the waterfowl sanctuary prior to December 1 and from the rest of the refuge by the last day of archery season.
- For all refuge hunts, the limit is one either-sex deer per hunt except for the archery season in which the statewide bag limit applies.
- Only shotguns with slugs, legal pistols, and muzzleloaders shooting a single projectile may be used or possessed during the Quota Gun Deer Hunt.
- Possession or use of buckshot is prohibited.
- The refuge is closed to all other public entry and use during the Quota Gun Deer Hunt.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, hunting is a priority public use activity that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

2) Description of Use: *Fishing*

Fishing on Wapanocca NWR is only permitted on Wapanocca Lake and Woody Pond from March 15 through October 31. The remainder of the year, these areas are closed as established waterfowl sanctuaries. Big Creek and other ditches that flow through the refuge are closed to fishing year-round. Sport fishing is permitted in accordance with Arkansas Game and Fish Commission (AGFC) regulations. Fishing with rod and reel, pole and line, and bow and arrow (on line) only is permitted. Fishermen are also permitted to collect crawfish with rakes and/or traps for personal use only. Harvesting of frogs, turtles, and mussels is prohibited. Access to fishing areas is by motor vehicle, bicycle, boat, or foot.

Commercial fishing is authorized only by special use permit and is covered under a separate compatibility determination.

Availability of Resources: Refuge staff and resources are adequate to cover management of fishing at current levels. However, it is anticipated that an increase in this use may occur over the coming years. In order to provide safe and quality fishing, additional resources and staff will be needed to enhance or develop additional access areas and provide law enforcement. A portion of the refuge's budget is spent annually managing for the benefit of freshwater fisheries, maintaining

boat launching ramps, improving access, conducting law enforcement patrols, and ensuring refuge visitors are in accordance with boater safety and following refuge regulations.

Anticipated Impacts of Use: Fishing is not expected to have substantial, long-term adverse impacts on fisheries or other wildlife resources at Wapanocca NWR including wildlife habitat. The activities associated with fishing, including travel to and from fishing areas, may cause trampling of vegetation, small invertebrates and vertebrates; however, these are short-term, relatively minor, and not highly repetitive. Also, fishing is not expected to result in negative indirect or cumulative impacts to refuge resources. As a consumptive use, fishing would have some minimal and short-term direct, localized impacts on refuge resources, including populations of target sport fish.

Fishing is a wholesome, enjoyable, and wildlife-dependent public use opportunity; however, participation in this activity generally results in litter on the refuge (fishing line, food, bait containers, soda/beer cans, and other "trash") that must be removed numerous times per year in order to keep the refuge looking presentable. Trash is detrimental to the aesthetics of the refuge and can impact the digestive tracts of birds, turtles, fish, and other resident and migratory wildlife. The refuge would strive to reduce this problem by working with partners to pick up litter, educating anglers not to litter, and through law enforcement. Information contained in the refuge brochure concerning rules and regulations also helps keep negative impacts to a minimum. Regulations are reviewed annually and modifications are made as necessary to maintain compatibility and ensure a safe and quality fishing program.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Conflicts between fisherman and hunters or other visitors using the fefuge for non-consumptive wildlife recreation have not been a problem and are not expected to be a problem in the future. Associated violations, such as taking under size fish, open fires and littering, can be minimized by public outreach and a continued law enforcement presence.

The following stipulations would help ensure the refuge fishing program is compatible with refuge purposes.

- All fishing tackle must be attended at all times.
- Crawfish may be collected for personal use only. All crawfish traps must have the owner's name and address permanently affixed.
- Taking or possessing frogs, turtles, and mussels is prohibited.
- Only fishing with rod and reel, pole and line, and bow and arrow (on line) will be allowed; no other methods or tackle will be permitted unless issued under a special use permit.
- Fishing is permitted on Wapanocca Lake and Woody Pond from March 15 through October 31.
- The refuge is closed to all other entry and public use (including fishing) during the Quota Gun Deer Hunt.
- Personal watercraft (e.g., jet-skis, hover craft, and airboats) are prohibited.
- All-terrain vehicles (ATVs) are not allowed for this use.
- All fishing equipment must be removed from the refuge on a daily basis.
- Public access to fishing areas may be closed at any time necessary to protect refuge resources or visitor safety.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, fishing is a priority public use activity that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

3) Description of Use: *Wildlife Observation and Photography*

Wildlife observation and photography are important public uses at Wapanocca NWR. Abundant wildlife and convenient access make Wapanocca NWR a destination for visitors hoping to observe and photograph a variety of wildlife and their habitats. Visitors are especially interested in viewing and photographing waterfowl, shorebirds, other migratory birds, including bald eagles, and resident wildlife such as white-tailed deer, eastern wild turkey, turtles, and raccoons. There are no developed facilities for this use, such as photo blinds or observation platforms, but such facilities are planned. Access is by vehicle, bicycle, boat, or foot. ATVs are not permitted for this use. All vehicle use is restricted to designated roads and parking areas only, and is not allowed in fields or other areas.

Availability of Resources: Refuge staff and resources are adequate to administer the program at current levels. However, it is anticipated that an increase in these uses will occur over the coming years. In order to provide safe and quality wildlife observation and photography opportunities, additional resources and staff will be needed to enhance or develop additional viewing areas and provide improved facilities and programs.

Anticipated Impacts of Use: The activities of visitors engaging in wildlife observation and photography may result in some potential disturbance to wildlife. Minimal impacts in the form of trampling small vertebrates or invertebrates and vegetation, and littering may also occur. Significant indirect or cumulative adverse impacts to refuge resources are not expected from these activities. The establishment of specified viewing areas and facilities, such as blinds, boardwalks, platforms, towers, and trails, would enhance observation and photography, as well as minimize associated visitor impacts or conflicts with other uses. Plans to provide such facilities are in progress.

Determination (check one below):
_____Use is Not Compatible
___X___Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Public access for specified wildlife observation and photography would be allowed in designated areas only. The waterfowl sanctuaries will be seasonally (December 1 to February 28) closed to all public entry and use. During the Quota Gun Deer Hunt, the refuge is closed to all public entry and use (including wildlife observation and photography) except by Quota Gun Deer Hunt permit holders. Regulations governing public use are reviewed annually and any necessary modifications are made to ensure refuge resources are

protected and visitors can enjoy a safe and quality experience. Wildlife observation and photography uses will be monitored and appropriate management action will be taken to eliminate or reduce associated impacts. Public access to wildlife observation and photography areas or facilities may be closed at any time necessary to ensure protection of refuge resources and visitor safety. All vehicle use is restricted to designated roads and parking areas only.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, wildlife observation and photography are priority public use activities that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

4) Description of Use: *Environmental Education and Interpretation*

On Wapanocca NWR, environmental education and interpretation activities are conducted to inform and educate the public and provide an understanding of natural resource values and refuge purposes and the mission of the National Wildlife Refuge System. The environmental education and interpretation program facilities will include visitor contact areas, kiosks, platforms or towers, routes or trails, and other designated public use facilities or access areas. In addition, refuge staff provide off-site environmental education and interpretation services at local events, such as festivals, fishing derbies, school classes, and civic or conservation group meetings. Access is by vehicle, boat, or foot. All vehicles may only be used on designated roads and parking areas and are not allowed in fields or other areas.

Availability of Resources: Refuge staff and resources are adequate to administer the program at current levels. However, it is anticipated that an increase in these uses will occur over the coming years. In order to provide safe and quality environmental education and interpretation opportunities, additional resources and staff will be needed to develop or provide enhanced programs and interpretive facilities (such as visitor contact stations, observation platforms, interpretative trails, kiosks, and other facilities). Plans are being developed to provide additional or improved facilities as described herein. Additionally, the utilization and development (training) of volunteers may supplement environmental education and interpretation programs.

Anticipated Impacts of Use: Outdoor environmental education and interpretation activities may result in minimal disturbance to wildlife from visitors. It is possible that some small vertebrates, invertebrates, and vegetation could be trampled. Littering may also occur. Significant indirect or direct cumulative adverse impacts to refuge resources are not expected from these activities. Environmental education and interpretation facilities, such as blinds, boardwalks, exhibits, kiosks, platforms, and towers, will be designed and established as feasible to minimize potential disturbance to wildlife and impacts to resources.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Environmental education and interpretation activities conducted outdoors should be appropriately located to minimize impacts and may need to be rotated or moved periodically. The waterfowl sanctuaries will be seasonally closed to all public entry and use. The refuge is closed to all public entry and use (including environmental education and interpretation) during the Quota Gun Deer Hunt, except for Quota Gun Deer Hunt permit holders. Regulations concerning public use are reviewed annually and any necessary modifications are incorporated into refuge brochures or otherwise conveyed to visitors. Environmental education and outreach can be taken into the classroom, incorporated into presentations, and will be used at other forums; these activities will have no deleterious affect on fish and wildlife at the refuge.

Justification: According to the National Wildlife Refuge System Improvement Act of 1997, environmental education and interpretation are priority public use activities that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
__X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

5) Description of Use: *Research and Monitoring*

Wapanocca NWR would allow university students and professors, as well as governmental or non-governmental employees and volunteers, to conduct short- or long-term research and monitoring studies. Such research and monitoring would be conducted in various habitats throughout the refuge and with various species of migratory birds, resident wildlife, and fish. The information collected would provide a better understanding of ecosystem functions and responses to management actions. Research and monitoring results would help managers to evaluate prior management actions, identify adaptive management options, and develop “Best Management Practices.” The knowledge gained through research and monitoring studies would allow more effective management decisions. All research and monitoring project requests would be evaluated on individual project merit and applicability to refuge programs on a project-by-project basis.

Availability of Resources: Resources are adequate to administer research and monitoring activity at the current level. The refuge will also seek to establish and/or expand partnerships for continued research and monitoring projects conducted by other organizations on refuge lands.

Anticipated Impacts of Use: There could be some negative impacts from scientific research and monitoring on the refuge. Impacts, such as trampling vegetation, ATV and motor boat use, and temporary disturbance to wildlife, would occur. A small number of individual plants or animals may be collected for further study. These collections would not likely adversely affect refuge plant and animal

populations. Removal of plant and animal material from the refuge, as well as the potential to accidentally introduce exotic plants and animals, must be carefully monitored and controlled. Some other impacts from research include: (1) Noise disturbance from helicopter, motorboat, airplane, airboat, truck, car, or ATV use that may temporarily disturb and/or displace wildlife; (2) physical presence of people or equipment that may temporarily disturb and/or displace wildlife; (3) ground disturbance from walking on site or the use of equipment; and (4) water disturbance by stirring sediments and causing temporary turbidity from equipment or walking. Despite these impacts, which are short-term, the knowledge gained from carefully considered and properly executed scientifically defensible research and monitoring would provide information and justification to improve management techniques and better meet the needs of trust species. Research/monitoring activities on the refuge are not expected to indirectly or cumulatively impact refuge resources negatively, even though some minimal short-term and direct impacts may occur.

Determination (check one below):
_____Use is Not Compatible
___X___Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: All researchers would be required to obtain and possess a refuge special use permit. Individual requests to use specialized equipment, all-terrain vehicles, etc., would be evaluated on a project-by-project basis and specified on each permit. Researchers would periodically be evaluated for compliance with requirements. Periodic progress reports would be required and final copies of all reports and publications would be provided to the refuge. The refuge would not directly supply personnel or equipment unless arrangements were made prior to issuance of the special use permit. The refuge manager would reserve the right to delegate a staff member to accompany permitee(s) at any time. All plants or animals sampled, collected, or released would be done in a scientifically accepted manner, such as those specified by scientific societies. Examples of these societies include the Society for the Study of Amphibians and Reptiles, the American Society of Mammologists, the American Ornithological Society, the Ichthyologists League, the Entomological Society of America, and the Botanical Society of America. Incidental take and inadvertent trampling of vegetation or wildlife are expected to be minimal and will be addressed with each special use permit request. Given compliance with the restrictions set in each permit, research and monitoring conducted on the refuge is considered to be compatible with the purposes for which the refuge was established.

Justification: Sound research and monitoring programs provide a better understanding of species, habitats, and the environmental communities present on the refuge. Additional research and monitoring is needed to assess management programs used on the refuge and to evaluate alternative options. The benefit of additional knowledge will greatly outweigh any temporary or short-term disturbance or loss of individual plants or animals that may occur. This activity will provide guidance to management for fulfilling refuge purposes and meeting established goals and objectives through adaptive management.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X___Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

6) Description of Use: *Forest Products Harvesting*

Conduct a comprehensive forest management program on Wapanocca NWR in accordance with an approved forest management plan. Refuge forest habitats will be evaluated over a 3-year cycle. Prescriptions detailing needed actions will then be developed, approved from the Service's Regional Office, and carried out on a yearly basis. It is proposed that select trees be sold, and then removed by commercial operations. The forest habitat may also be manipulated by permitees/staff when commercial sales are not feasible. Only trees needing to be removed in order to improve the forest habitat for wildlife or to restore the integrity of the forested wetlands ecosystem will be taken or manipulated. Special use permits may be issued for firewood cutting (personal use) when there is excess downed wood from silvicultural operations or when roads are widened. Seasonal special use permits may be issued for gathering seed, on a limited basis, when forest seed crops are abundant.

Operations may be conducted throughout the year, but only according to the guidelines detailed in the Forest Habitat Management Plan. Operations may involve numerous individuals using hand tools such as chain saws and heavy equipment such as feller-bunchers, skidders, bulldozers, and log trucks.

Availability of Resources: Some elements of needed resources are already in place, such as the forester's time and salary, and the small amount of time needed by other positions in maintenance, law enforcement, management, and administration. Additional expenses for equipment maintenance, operating expenses, and habitat restoration can be funded out of the refuge's budget. The Forest Habitat Management Plan allows that management will be carried out to the extent of available resources (see Section 3.2; Physical Plant and Equipment Use Requirements for a more detailed description).

Anticipated Impacts of the Use: Timber harvest operations will result in short-term disturbances and long-term benefits to forest habitats. Short-term impacts will include disturbance and displacement of wildlife, vegetation, and soils typical of any heavy equipment operation. Operation of heavy equipment and removal of some vegetation will also result in a short-term increase in soil erosion. Additionally, wildlife species dependent on undisturbed forest habitat will be temporarily displaced. As vegetation is disturbed, other wildlife species may also be temporarily displaced. Over time, these short-term impacts will wane as the effects of improvement treatments develop and the benefits are realized. The refuge is divided into seven forest compartments; therefore, short-term impacts will be minimized by implementing the proposed actions in only a small percentage of the refuge at any given time.

Firewood cutting and forest seed collecting will result in temporary disturbances. Seeds are gathered by hand and sold to local nurseries that, in turn, grow seedlings. The refuge has a need for seedlings to restore marginal cropland and other open fields. By allowing a limited forest seed harvest, the refuge is ensuring a continued supply of suitable seedlings of local origin for forest restoration. In the past, participation in refuge firewood cutting and hand collecting of forest seeds has been low, and future participation is also expected to be low. The quantity and frequency of firewood cutting and seed harvesting is not expected to result in significant disturbance, diminish wildlife food resources, or jeopardize wildlife survival. Short-term disturbance to wildlife may occur during these activities, but will be insignificant because of the small scale of the projects. Most of the use will occur in late summer or fall, after ground nesting birds have completed the nesting season. Firewood cutting or seed collecting should not result in short- or long-term impacts that adversely affect the purpose of the refuge or the mission of the National Wildlife Refuge System.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:
See General and Specific Guidelines in the Forest Habitat Management Plan, Appendix 7.10 and Appendix 7.11.

7.10 General Conditions Applicable To Timber Harvesting Permits

Subcontractors: Subcontractors or agents may be employed with authorization from the refuge forester.

Safety Requirements: The contractor must perform this contract in a safe manner, observing any necessary safety precautions. The contractor will promptly correct any condition, which, in the opinion of the refuge manager or his authorized representative, endangers the safety of personnel, the public, and/or property during the performance of this contract. Failure to observe this requirement will result in contract termination, with the contractor liable for any such damages that may occur.

Liabilities of the Contractor: The contractor will hold the government and all its representatives harmless from all suits, actions, or claims of any character arising out of the injuries to any person or damage to any property resulting from any neglect in the performance of the services required by this contract, or from any claims arising or recovered under the Workman's Compensation laws or any other law, by-law, ordinance, order or decree, or on account of any other act or omission by the contractor or his employees while carrying on operations under this contract. This responsibility will terminate when suits, actions, or claims have been satisfied.

Insurance Coverage: The contractor must be covered by adequate insurance, as the government will assume no liability whatsoever as a result of the contractor's operations under this contract.

Inspection of Work Site: Before submitting a bid, prospective bidders are urged to personally inspect the site. Arrangements to view may be made by contacting Cache River National Wildlife Refuge, Augusta, Arkansas. Telephone (870) 347-2614.

7.11 Special Conditions Applicable To Timber Harvesting Permits

- A pre-entry conference between the refuge rorester and the designated permitee representative will be required before the permitee starts logging operations. The purpose of the pre-entry conference is to be sure that the permitee completely understands what is expected and thus minimizes conflicts.
- All refuge wildlife is protected. All reasonable efforts will be made by the permitee to protect wildlife from harm and harassment.
- All logging will be within the boundaries specified on the attached map.
- Trees will be cut so as to leave ground-level paint spots visible after the tree has been cut. All marked trees are to be cut, with the exception of marked leave trees in shelterwood, seed tree, or small open areas as described in the special use permit.
- Only marked or designated trees will be cut. Care will be taken to protect all other trees and vegetation from damage. Unmarked trees that are cut or injured through carelessness will result in a fine of $5 per inch diameter at stump height or breast height if present.
- Trees and tops will not be left hanging or supported by any other tree and will be laid down immediately after felling.
- Tops and logging debris will be lopped to within 6 feet of the ground in all areas 100 feet or less from major roads.

- All roads, rights-of-way, active agricultural fields, designated openings, ditches, and streams must be kept clear of tops and debris. The permitee is required to repair all damage resulting from operations conducted under this permit.
- The skidding of logs greater than 20 feet in length may be prohibited in designated areas.
- The refuge manager or his authorized representative must approve the location of additional roads. Additional trees removed for roads or loading sites will be marked by the refuge forester and paid for at bid price.
- Loading of forest products on public roads or shoulders, or regeneration areas is prohibited.
- Logging will not be permitted when the ground is wet and subject to rutting and severe compaction. The permitee and his employees will do all in their power to prevent rutting and erosion.
- The permitee and his employees will do all within their power to prevent and suppress forest fires. Fires will be reported immediately to the refuge office.
- Ownership of all products remaining on a sale area will revert back to the government upon termination of the permit.
- Littering in any manner is a violation of the Code of Federal Regulations. The entire work area will be kept free of all litter at all times.
- The possession or use of firearms of other weapons on the refuge is prohibited outside of hunting seasons.
- The government accepts no responsibility to provide rights-of-way over private lands for materials sold under this contract.
- The refuge manager or his authorized representative will have the authority to temporarily close down all or any part of the operation during a period of high fire danger, wet ground conditions, or for any other reason deemed necessary. Additional time, equal to the closing period, will be granted to the permitee.
- The decision of the refuge manager will be final in the interpretation of the regulations and provisions governing the sale, cutting, and removal of the timber products covered by this permit.

Justification: This use has been determined compatible provided the above stipulations are implemented. This use will facilitate the primary purpose of the refuge, which is to provide waterfowl habitat and to conserve other migratory birds and wildlife. This use will meet the mission of the National Wildlife Refuge System and enhances fish, wildlife, and plant resources on these lands by providing renewable resources for the benefit of the American public. This use will be administered in compliance with 50 CFR 29.1.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

7) Description of Use: *Commercial Guiding for Wildlife Observation/Photography*

Allow commercial guiding to facilitate Wildlife Observation/Photography on Wapanocca NWR. The objective is to provide the opportunity to experience wildlife observation and photography to the segment of the public lacking the knowledge or equipment required to view/photograph fish, wildlife, plants, or their habitats in compliance with the legal mandates of the National Wildlife Refuge System Improvement Act of 1997 concerning compatibility and priority public use. The surrounding communities, including Turrell, Gilmore and Clarksdale, are dependent on supporting refuge visitors throughout the year. Within these communities, grocery stores, sporting goods stores, restaurants, lodges, and other businesses obtain a large proportion of their annual income from the influx of refuge visitors. Although wildlife observation and photography is involved on guided trips, the commercial nature of guiding activities associated with this use does not qualify as one of the six priority public uses of refuges (Federal Register/Vol.65, No.202/Wednesday, October 18, 2000/Rules and Regulations-Issue 13: Priority Uses, Pages 62471 and 62472). All commercial activities, including guiding of wildlife observers and photographers, are special type uses that may be authorized when they are appropriate and compatible with the purpose of the refuge, the mission of the National Wildlife Refuge System, and can be administered in a way that minimizes conflicts with priority uses and does not hinder the activities of visiting public not using guide services.

Guiding and equipment may involve the use of vehicles, buses, motor boats, paddle boats, canoes, and hiking. Guiding will be allowed only in designated areas and according to conditions specified by the refuge manager. Several miles of refuge roads are also used to access remote sloughs, bayous, and lakes where wildlife observers and photographers may conduct their activities.

Guides will be allowed to operate through issuance of a special use permit, which must be renewed annually. Special conditions are attached and part of the permit designed to meet the above objectives and provide liability protection to the government. The annual fee for the special use permit will be $500.

Increased requests for special use permits to conduct wildlife observation and photography guiding on Wapanocca NWR are expected in the future. Permits will be issued on a first-come, first-serve basis. The refuge reserves the option to limit the number of permits issued as necessary to ensure compatibility. If requests increase for commercial wildlife observation and photography guiding permits, they will be reviewed by management and additional steps taken, including limiting the number of guides, increasing annual permit fees, designating observation areas, or discontinuing this use entirely, as may be necessary to maintain safe and quality wildlife observation and photography opportunities for all refuge visitors.

Availability of Resources: Adequate funding and staff exist to administer refuge regulations and special use permit conditions at the current level of interest for this activity. An increase in permit issuance may not be possible with the current existing staff. Any increase will be reviewed by management to ensure compatibility.

Anticipated Impacts of the Use: Commercial guiding for wildlife observation/photography would increase opportunities for the public to experience wildlife and gain an added appreciation for the value of Wapanocca NWR and the National Wildlife Refuge System. This use would benefit a diverse set of participants from within and outside this local area. The use also would allow some economic benefit to local communities from refuge visitation. Minor impacts such as short-term and temporary wildlife disturbance could result. In addition, there could be minor trampling of vegetation and small vertebrates and invertebrates. These impacts are not expected to be significant.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: A special use permit is required.

- No special privileges are granted to the permitee other than those stated in the special use permit. Interfering with any other individual lawfully participating in any authorized activity on the refuge will be grounds for immediate revocation of the permit and for possible legal prosecution.
- The permitee and assistant each must comply with all applicable federal, state, and refuge laws, regulations, and policy.
- A copy of the special use permit must be in the possession of the permitee and assistant while engaged in commercial guiding activities.
- Guided parties are limited to fifteen (15) members and the permitee and his assistant who must all stay together as one (1) party on the refuge. Only one (1) party may be guided per day. The permitee must accompany all parties. Any exception to this requirement must be applied for and approved by the refuge manager prior to such event.
- Within one (1) week after the end of the calendar year, the permitee must furnish the refuge manager a written report on the number of individuals taken onto the refuge and fees charged.
- The special use permit may be terminated or revoked at any time without refund to the permitee for non-compliance with any of the terms thereof. Any violation may be grounds for future permit denial.
- The permitee and their agents and guests shall save, hold harmless, defend, and indemnify the United States of America, its agents, and employees for loss, damages, or judgments and expenses on account of bodily injury, death or property damage, or claims for bodily injury, death, or property damage of any nature whatsoever, and by whomever made, arising out of the permitee, his employees, subcontractors, or agents with respect to conducting activities connected with the special use permit within the lands administered by Wapanocca NWR.
- Permitee must provide proof of liability insurance ($300,000 each occurrence, $500,000 aggregate) with the U.S. Fish and Wildlife Service named as co-insured prior to issuance of the special use permit.
- ALL equipment must be removed from the refuge daily.
- The refuge may limit the number of special use permits issued or discontinue this use entirely in order to ensure appropriateness, compatibility, and safe, quality opportunities for visitors not using guide services.

Justification: Commercial activities can be allowed on refuges when they do not conflict with the provisions of the National Wildlife Refuge System Improvement Act of 1997 and resulting policies and regulations. The special use permit conditions provide adequate regulation of this specialized activity and quality wildlife observation and photography opportunities for all refuge visitors will be ensured. Commercially guided wildlife observation and photography is a public use that will allow the unskilled or inexperienced participants to enjoy, experience, and learn about native wildlife and habitats in this bottomland hardwood environment. This commercial wildlife observation/photography use is being implemented in compliance with the legal mandates of the National Wildlife Refuge System Improvement Act, including compatibility.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-Year Re-evaluation Date:

8) Description of Use: *Commercial Video and Photography*

Allow commercial video and photography activities on Wapanocca NWR for the purpose of exposing the public to the refuge and to promote recognition of the diverse wildlife and habitats found there. Over the past several years, Wapanocca NWR has been contacted as to the possibility of producing commercial audio-visual productions such as video and still photographs. The refuge provides a variety of natural habitats abundant with wildlife and is an ideal setting for filmmakers. As central Arkansas and Service programs for visitors are promoted, demand for commercial filming on the refuge may increase.

Availability of Resources: Adequate refuge staff and resources are available to administer this activity at the current level.

Anticipated Impacts of Use: Commercially produced video and photography could result in some disturbance to wildlife. Some minimal trampling of vegetation, invertebrates, and small vertebrates may also occur. However, it is anticipated that this disturbance would be minimal, short-term, localized, and not highly repetitive. Commercially produced video and photography activities are not expected to indirectly or cumulatively impact refuge resources negatively.

Determination (check one below):
_____Use is Not Compatible
___X___Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Access for commercially produced video and photography activities would be allowed in designated areas only under special use permit. Activities would be monitored to document any negative impacts to wildlife; if negative impacts are found, corrective action would be taken to reduce or eliminate these impacts. Access to key observation and photography areas may be closed during adverse weather conditions for protection of infrastructure (roads, levees, etc.), and visitor safety.

Public Law 106-206, signed by the President on May 26, 2000, directed the Secretary of the Interior to require a special use permit and establish a reasonable fee for commercial filming activities on federal lands administered by the Secretary. This law further stated that for still photography neither a special use permit nor a fee is assessed if the activities take place on lands where members of the public are generally allowed. The Secretary may require a special use permit and fee if photographic activities take place at locations where the general public is not allowed or where additional administrative costs are likely.

The Secretary shall not permit any filming, still photography, or other related activity if the Secretary determines:

- There is a likelihood of resource damage;
- There would be an unreasonable disruption of the public's use and enjoyment of the site; or
- That the activity poses health or safety risks to the public.

Further guidance is found in 43 CFR 5.1 and 50 CFR 27.71, which regulate the making of pictures, television productions, or sound tracks on national wildlife refuges.

- A special use permit is required of any party except amateur photographers or bona fide newsreel and news television photographers and soundmen. All other parties must obtain written permission from local officials having administrative responsibility for the area involved.
- However, the Secretary has determined that no fee will be charged for the making of such motion pictures, television productions, or sound tracks on areas administered by the U.S. Fish and Wildlife Service (Note: this provision is currently under Departmental review).
- A bond shall be furnished, or deposit made in cash or by certified check, in an amount to be set by the official in charge of the area to insure full compliance with all conditions prescribed in the special use permit. Such bond may be refunded to the applicant if all special use permit requirements are met and no costs to the government are incurred.
- Permission to make a motion picture, television production, or sound track will be granted by the head of the Service or his/her authorized representative in his/her discretion and on acceptance by the applicant of conditions set forth in a special use permit. Applicants must describe the area where filming is requested and the scope of the filming or production or recording. Dependent upon weather conditions, applicants will state when filming or other production will begin and end.

Other stipulations include:

- Utmost care will be exercised to see that no natural features are injured, and after completion of the work, the area will, as required by the refuge manager, either be cleaned up and restored to its prior condition or left, after cleanup, in a condition satisfactory to the refuge manager.
- Credit will be given to the Department of the Interior and the U.S. Fish and Wildlife Service through the use of an appropriate title or announcement, unless the refuge manager issues a written statement that no such courtesy credit is desired. A copy of the final product will be provided pro bono to the refuge staff.
- Pictures will be taken of wildlife only when such wildlife will be shown in its natural state or under approved management conditions, if such wildlife is confined.
- Any special instructions received from refuge manager will be complied with.
- Any additional information relating to the privilege applied for by the applicant will be furnished upon request.
- Other stipulations may be warranted depending upon the proposed location and season of the year the activity is conducted.

Further guidance on this activity is found in the Service Manual 650 FW 5.

The following stipulations apply to special use permits issued for commercially produced video and photography activities. To minimize impacts on refuge lands and resources, the refuge manager will ensure that filmmakers comply with policies, rules, and regulations, and will monitor and assess all activities of filmmakers.

- Failure to abide by any part of a special use permit: violation of any refuge-related provision in Titles 43 or 50, Code of Federal Regulations; or any pertinent state regulation (e.g., fish or game violation) will be considered grounds for immediate revocation of the special use permit and could result in denial of future permit requests for lands administered by the U.S. Fish and Wildlife Service. This provision applies to all persons working under the authority of the permit.
- The permitee is responsible for ensuring that all employees, party members, and any other persons working for the permitee and conducting activities allowed by the special use permit are familiar with and adhere to the conditions of the special use permit.

- The special use permit may be canceled or revised at any time by the refuge manager for non-compliance or in case of emergency (e.g., public safety, unusual resource problems). The permitee and permitee's clients do not have exclusive use of the site(s) or lands covered by the special use permit.
- Prior to beginning any activities allowed by the special use permit, the permitee shall provide the refuge with: (1) A copy of current business license; and (2) proof of comprehensive general liability insurance.
- Prior to conducting commercial filming activities, the permitee shall provide the refuge manager with the name and method of contact for the field party chief or supervisor.
- A valid copy of the special use permit, signed by the refuge manager or designee, must be in the party leader's possession at all times, while exercising the privileges of the permit.
- Endorsement of the special use permit signifies the permitee's understanding and concurrence with all the conditions set forth in the General Conditions found on the reverse side of the special use permit and the above Special Conditions.

Under the stipulations described above, commercially produced filmmaking, production, or sound track recording is viewed as compatible with the purposes for which the refuge was established.

Justification: Commercial video and photography are economic uses that must contribute to the achievement of refuge purposes or the mission of the National Wildlife Refuge System. The products derived may educate groups of people that may not normally know about the refuge, such as the elderly, handicapped, or urban youth groups. The services provided by commercial filmmakers will be beneficial to extend public appreciation and understanding of wildlife, natural habitats, and the mission of the Refuge System. Conditions imposed in the special use permit of filmmakers ensure that these wildlife-dependent activities can occur without adverse effects to refuge resources or other visitors. The activity will be required to have a primary focus on education and information about refuge purposes and the Refuge System mission.

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

_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

9) Description of Use: *Nuisance Animal Control*

This activity would allow a managed and highly targeted program for the take of nuisance animals on Wapanocca NWR that are harmful to refuge habitat and/or infrastructure critical to refuge habitat management and operations, and therefore a threat to the trust species that inhabit or utilize the refuge. Currently, this program will specifically address beaver, nutria, and feral hogs, but may be expanded to other species if necessary and in compliance with Arkansas Game and Fish Commission (AGFC) regulations, to address future harmful impacts caused by exotic or invasive species and prevent or control problems such as disease outbreaks involving furbearers or excessive predation on trust species.

Semi-aquatic Component
The hydrology and habitat of the refuge is such that semi-aquatic animals, specifically, beaver (*Castor canadensis*) and nutria (*Myocastor coypus*), have become prolific and their dense populations have degraded habitat for other wildlife usage. Beaver naturally impound water to enhance accessibility and extend usable habitat beyond the stream channel. Under normal hydrologic and population conditions, beavers are held in check by availability of water and natural predators, and under these conditions their impoundments may provide beneficial aquatic microhabitats containing scrub-shrub vegetation and trees. However, the amount of irrigated cropland on the refuge provides beavers with a “dry” season water supply from irrigation runoff. Beaver and nutria have little pressure from natural predators. Beaver populations have grown to the point that impoundments have been rebuilt for many years and impounded areas have grown in size. Over the long term, these impoundments degrade the habitat both within and surrounding the area, because the woody vegetation within the impoundments decreases in diversity and abundance, and trees eventually will be excluded altogether. The water table surrounding the impoundment is elevated, altering the forest species composition and degrading quality and health. The hydrology itself is impacted as sediment and organic material from decomposing aquatic vegetation accumulates in the impoundment and impedes the ability of the site to dewater. Additionally, water quality in impounded areas is negatively affected due to increased water temperature and turbidity and decreased dissolved oxygen, and reduced species diversity.

Nutria are non-native herbivores that cause negative impacts on wildlife habitat by consuming and destroying aquatic vegetation, and burrowing in levees of migratory bird impoundments. Their constant burrowing causes roads and levees to collapse, which ultimately poses a major safety issues for refuge personnel and visitors. These activities degrade habitat managed for waterfowl, shorebirds, and other desired species. Their foraging activities also result in competition with waterfowl for food resources.

Refuge staff remove beaver impoundments annually and opportunistically, and conduct wintertime trapping and shooting, but do not have resources to consistently and effectively pursue sufficient control to protect the habitat resources from beaver and nutria impacts.

Terrestrial Component
The presence of feral hogs (*Sus scrofa*) has been documented on the refuge and observed on several occasions in the recent past. The animals are not native and have few natural predators. The hogs compete with resident wildlife for forage, which includes herbaceous vegetation, roots, acorns, invertebrates, and mammals. Additionally, the animals degrade habitat by rooting and digging wallows. Hardwood plantings used to restore marginal agricultural lands to productive, forested, wildlife habitat are threatened by these animals. Also, there is the potential for the feral hog to carry and transmit a number of infectious diseases to resident wildlife and humans. Currently, the refuge allows the take of feral hogs during any legal refuge hunt, but the staff has implemented no

further control measures. Similar to the beaver and nutria problem, the refuge does not have the resources to pursue sufficient control to protect the habitat and wildlife from this threat.

Permit System
As necessary to protect refuge resources, the staff may issue special use permits to individuals for the take of nuisance beaver, nutria, and feral hogs. Permits may be issued refuge-wide, or permitees may be directed to certain areas with known overpopulation or habitat damage issues. The take may consist of trapping, shooting, or other methods approved by the AGFC, and the permitee will be allowed to retain the animals, pelts, tails, and any bounties from animals taken under the special use permit. Because there are advantages to trapping or shooting in virtually all seasons, permits will be valid year-round, unless otherwise specified in the permit, or specified later by the refuge manager. In the case of feral hogs, control measures will be limited to shooting and/or live trapping. Captured animals will be dispatched by gunshot.

Availability of Resources: Refuge staff and resources are adequate to administer this program. Refuge expenditures for issuing special use permits, oversight, and enforcement will be minimal. To closely monitor the program and to protect non-target animals, the refuge may issue only a small number of special use permits annually.

Anticipated Impacts of Use: The take of nuisance animals will involve the use of vehicles, boats, ATVs, or walking in approved areas, setting of traps or snares, and discharge of firearms, which will result in only normal short-term disturbances similar to those associated with other refuge approved uses (e.g., hunting, fishing, birding).

With respect to beavers and nutria, the short-term benefits of this program should result in decreased nuisance animal populations and reduced inundation of refuge habitats and damage to infrastructure. As nuisance animal populations decrease, the number, size, and frequency of rebuilt beaver impoundments should also decrease. The refuge will spend less time and expense on the removal of impoundments and can redirect these resources to other habitat restoration and management activities. Damage to infrastructure and habitat should be reduced. In the long-term, degraded habitats will return to a more normal hydrologic regime and will be reclaimed by native hardwoods and natural riparian vegetation, which will result in increased benefits to trust resources and associated wildlife-dependent recreation.

With respect to feral hogs, the short-term benefits of this program should be realized in re-growth and/or recovery of hardwood plantations, and other young plant communities and soils that were formerly disturbed. In addition, local wildlife populations will have relief from this non-native competitor/predator. In the long-term, a reduction in feral hog numbers and associated damage and disease potential will result in enhanced conditions for trust resources and associated wildlife-dependent recreation.

Determination (check one below):
_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- The use will be administered under conditions of a special use permit issued by the refuge manager that will enable control efforts to be directed to problem areas and specify methods and procedures to ensure protection of staff, visitors, and refuge resources.
- Use will be conducted to minimize risk of injury or take of non-target species and disturbance to refuge habitats.

- Use will be conducted to avoid any conflicts with refuge visitors.
- Permitee will comply with all applicable state and federal regulations.
- Activities under this special use permit will not be conducted in waterfowl sanctuaries during annual closure periods.
- Permitee will provide locations of beaver dams and lodges and other problem areas, as well as number and location of species taken.
- All target animals will be immediately dispatched by gunshot.
- The permitee and their agents and guests shall save, hold harmless, defend, and indemnify the United States of America, its agents, and employees for loss, damages, or judgments and expenses on account of bodily injury, death, or property damage, or claims for bodily injury, death, or property damage of any nature whatsoever, and by whomever made, arising out of the permitee, his employees, subcontractors, or agents with respect to conducting activities connected with the special use permit within the lands administered by the refuge.
- Special use permit may be revoked at any time by the refuge manager.
- Refuge manager may discontinue this use at any time.

Justification: This use has been determined compatible provided the above stipulations are implemented. This use will facilitate the primary purpose of the refuge, which is to provide waterfowl habitat and to conserve other migratory birds and wildlife. This use will meet the mission of the National Wildlife Refuge System by conserving fish, wildlife, and plant resources on these lands and providing renewable resources for the benefit of the American public. This use will be administered in compliance with 50 CFR 29.1 and EO 13112.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

10) Description of Use: *Cooperative Farming*

Continue the cooperative farming program on Wapanocca NWR that includes the production of approximately 500 acres of primarily wheat, soybean, grain, milo, sunflowers, and moist-soil habitats on this 5,620-acre refuge. Approximately 160 acres of moist-soil management units will be rotated into the refuge crop-share as needed to accomplish habitat management objectives. Cropland acres not currently utilized by waterfowl will be converted to grassland management to provide benefits for other migratory birds. The farming program is necessary for meeting refuge purpose, goals, and objectives by providing supplemental food resources and/or habitat for waterfowl, shorebirds, other migratory birds, and other native wildlife. Farming would be conducted on a crop-share basis with the farmer providing all equipment, seed, fertilizer, labor, and other costs associated with growing and selling a crop. The refuge would not be required to provide any costs associated with growing the crop and only provides the land base and oversight for the program.

Availability of Resources: The refuge does not have the staff or the funds to accomplish this critical habitat management program internally. Food production goals are accomplished through a cooperative agreement with a local farmer. Staffing levels are adequate to administer the program through this cooperative arrangement.

Anticipated Impacts of Use:

- Food is produced to help meet refuge purposes and goals (high-energy foods to maintain body condition and health of migrating and wintering waterfowl, wading birds, and shorebirds).
- Hydrology is partially restored on a portion of cropland acres.
- Woody plant encroachment and invasive plant invastions are controlled in moist-soil management units.
- Increased diversity of habitats and forage for waterfowl and other migratory birds.
- Numbers and diversity of waterfowl and other migratory birds using refuge habitats for wintering, staging, and migration will increase.
- Soil erosion will occur, but impacts will be minor due to soil conservation measures.

Determination (check one below):

_____Use is Not Compatible
__X__Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Farming will be accomplished only on areas vital to meet refuge objectives. Fall tillage will not be permitted unless planted to a cover crop. Only Service-approved pesticides will be used. No approved post-emergence pesticide will be used unless crop scouting indicates pest density is at or beyond the economic threshold. Pesticide applicator must comply with all label and other written instructions pertaining to the use of the specific pesticide. Regular scouting must be conducted to keep track of insect infestations and microbial products given the first consideration in fighting insect pests.

Continue to use cooperative farming on a 75:25 crop-share basis on 498 acres of existing agricultural lands on Wapanocca NWR to maintain overall health and diversity of refuge habitats and provide critical foraging habitats for waterfowl, shorebirds, and other migratory birds and native wildlife.

Due to extended trends of low populations of wintering Canada geese on Wapanocca NWR, convert up to 263 acres of the current 761 acres of cropland to grassland habitat. These acres will include the higher elevation sandy ridges spread throughout the farm acreage that prior to European settlement, consisted of native grassland habitat. If numbers of wintering Canada Ggese return to their former levels, these acres will be recycled back into the farm program for use as winter browse habitat. Implement the transition to grassland habitat over a period of 3 to 5 years, beginning in the 2010 farm year.

Incorporate up to 160 acres of moist-soil units into the refuge's 25 percent share of the crops as necessary to assist in control of invasive vegetation, set back woody encroachment, and to allow cultivation of crops in the moist-soil units to increase the supply of hot foods available to wintering waterfowl.

Justification: The Biological Review, conducted in 2003 of farming on the refuge, reiterated the need for supplemental foods on the refuge to help meet waterfowl objectives. The refuge lacks personnel and equipment to farm by force account. Cooperative farming must be utilized, which increases the amount of cropland necessary to meet objectives. However, the amount of acreage being farmed for the refuge share is not in excess of direct need for the benefit of migratory birds in fulfillment of refuge purpose. Agricultural lands in conjunction with native habitats increase the biological diversity of the refuge and are utilized by a large variety of migratory and resident species.

Wildlife observation is enhanced by attracting species to uplands and wetlands managed through the cooperative farming program. This use will be administered in compliance with 50 CFR 29.1.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

11) Description of Use: *Commercial Fishing*

Allow commercial fishing on Wapanocca NWR to remove rough fish, including buffalo, carp, drum, bowfin, and gar, for the benefit of priority fish species and their habitats through the issuance of a special use permit.

Commercial fishing is utilized to remove fish commonly known as rough fish from refuge waters. The species permitted for commercial harvest include German carp, silver carp, big head carp, grass carp, black carp, buffalo, and catfish. The five carp species are exotics, which as a group, compete with and negatively impact habitat of native fisheries within the refuge and ecosystem. The overly abundant native buffalo, and to a lesser degree, catfish also compete with other native fisheries.

Availability of Resources: Current facilities, equipment, and staff are adequate to properly and safely administer this use.

Anticipated Impacts of Use: The primary impact is the removal of exotic, non-game fish. The program involves reducing numbers of these fishes (because eradication is not feasible) and reducing negative impacts to aquatic habitats and certain sport fishes. Incidental take of sport fish may occur in associated with this use, but is not expected to result in any long-term or cumulative negative impacts. There is no long-term adverse impact to habitat or native fish and wildlife. Commercial harvest of non-game fish should enhance water quality and survival of other fish species, and provide local economic benefit.

Determination (check one below):
_____Use is Not Compatible
___X___Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: All sport fish caught must be released back into the lake. Minimum net mesh size will be 41/2 inches. Nets must be attended daily. Commercial fishing will not be allowed from November 1 – February 28 to minimize disturbance to waterfowl and wintering eagles.

Justification: One of the primary objectives of the National Wildlife Refuge System is to remove exotics from refuges and to restore historic native populations. Removal of exotics and a reduction in rough fish population by commercial harvest is a management practice aimed at reducing adverse impacts to water quality and aquatic habitats. Bottom feeders, such as carp and buffalo, stir up sediments which exacerbates turbidity and impacts nesting and spawning habitat for other fishes.

Fishery biologists with the Service have long recommended commercial harvest of these species to refuge managers as a management tool with the objective to increase/restore native fish populations on refuges. Commercial harvest of these species is considered a management economic activity that will result in removing exotics, improving quality of aquatic habitats, favorably impacting recreational fishing opportunities, and providing economic benefits to the local community. This use will be administered in compliance with 50 CFR 29.1.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

12) *Construction of Headquarters/Visitor Contact Station at Wapanocca NWR*

The current headquarters/visitor contact station, located 1/4-mile south of Turrell, Arkansas, in Crittenden County, has deteriorated to the point where renovation and rehabilitation to correct deficiencies and inadequacies in structural integrity, accessibility features, HVAC and water systems, lighting, insulation, and health/safety aspects are neither advisable nor cost effective. Funding has been obtained through the American Reinvestment and Recovery Act (ARRA) for replacement of the existing headquarters/visitor contact station with a suitable facility to allow for efficient management of public use and administration of a visitor services program, including opportunities for environmental education and interpretation. The proposed headquarters/visitor contact station would be 1-story, approximately 2,500 square feet in size, would be fully ADA-compliant, and would include a volunteer/receptionist area, exhibit area, conference room, break room, law enforcement storage, public restrooms, staff offices, and public parking. The existing building would be removed and the new facility would be constructed on the same site, thereby minimizing site disturbance and habitat loss, and would incorporate energy- and resource-conserving features to reduce environmental impacts. The new facility would be used as headquarters from which all management and public use programs for Wapanocca NWR would be administered, including environmental education and interpretation programs. More than 20,000 visitors would use this facility annually. The visitor contact station would be open to public during regular business hours.

Availability of Resources: The planning/design, engineering, and construction would be funded through ARRA. The new facility would incorporate energy-conserving features and low maintenance design and components. Annual maintenance and operations needs are expected to remain within the capabilities of the staff and funding levels.

Anticipated Impacts of the Use: Minor, temporary surface disturbance would occur around the construction site. Proper erosion control measures would be implemented and disturbed surfaces would be revegetated following construction. The new headquarters/visitor contact station would replace the existing office, utilizing the same footprint; therefore, no wildlife habitat would be destroyed. Noise and activity around the construction site may temporarily displace some wildlife, such as birds, small mammals, reptiles, and amphibians. Some trampling of vegetation and perhaps small vertebrates and invertebrates may occur, but these losses would be minor. The impacts of these activities would be temporary and not cumulative over the long term. The new building would

incorporate green-building design and features that would lessen the environmental effects of the operation and use of the facility.

Determination:

_____ Use is Not Compatible

___X___ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Energy-conserving features would be incorporated into building design, construction activities would be conducted in such a manner that disturbance to the site and wildlife would be minimized, and safety precautions would be implemented to prevent risk of injury to visitors and staff. The new facility would be used to enable achievement of the refuge purposes and facilitate management programs for the benefit of trust species.

Justification: This project is not a new construction but a replacement of existing facilities utilizing an existing building footprint. Work activities would have no or negligible environmental effects. This project would be completely funded through ARRA and would enable the refuge to better fulfill the refuge purpose by facilitating habitat restoration, management, and conservation programs for trust species. Furthermore, the construction and operation of this facility would promote compatible public uses, including environmental education and interpretation that would serve to increase public awareness of the need for and value of Wapanocca NWR and the Refuge System, and garner support for refuge programs.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*
_____Categorical Exclusion without Environmental Action Statement
_____Categorical Exclusion and Environmental Action Statement
___X__Environmental Assessment and Finding of No Significant Impact
_____Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Approval of Compatibility Determinations

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

Signature: Refuge Manager: _____
(Signature/Date)

Review: Regional Compatibility Coordinator: _____
(Signature/Date)

Review: Refuge Supervisor: _____
(Signature/Date)

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

The following Compatibility Determinations for Cache River NWR were completed prior to the completion of the CCP and are included herein for reference purposes.

COMPATIBILITY DETERMINATION

REPLACEMENT OF U.S. HIGHWAY 79 STRUCTURE AND APPROACHES NEAR THE CITY OF CLARENDON IN MONROE COUNTY, ARKANSAS

USE: Granting of replacement right-of-way for existing Hwy. 79 for the purpose of new bridge (and approaches) construction over the White River and associated floodplain.

REFUGE NAME(S): White River National Wildlife Refuge (Established in 1935), Cache River National Wildlife Refuge (Established in 1986)

ESTABLISHING AND ACQUISITION AUTHORITIES:

White River NWR
Executive Order 7173, 4 September 1935; Migratory Bird Conservation Act

Cache River NWR
Emergency Wetlands Act; Migratory Bird Conservation Act; Fish and Wildlife Act of 1956

REFUGE PURPOSE(S):

White River NWR
"... As a refuge and breeding ground for migratory birds and other wildlife..." (Executive Order 7173, 4 September 1935).

"...For use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act).

"... 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..."(Fish and Wildlife Coordination Act).

"...Suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species.." 16 U.S.C., 460k-1"... the Secretary...may accept and use ...real...property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors..." 16 U.S.C., 460k-2 (Refuge Recreation Act; 16 U.S.C., 460k-460k-4, as amended).

"...Provide environmental and economic benefits to the State of Arkansas...and to the Nation." (Arkansas-Idaho Exchange Act of 1992).

COPY

Cache River NWR

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act).

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and help to fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901 (b) (Emergency Wetlands Resources Act of 1986).

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources..." 16 U.S.C. 742f (a) (4). (Fish and Wildlife Act of 1956).

"... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. 742(b) (1) (Fish and Wildlife Act of 1956),

"(1) to protect, enhance, restore, and manage an appropriate distribution and diversity of wetland ecosystems and other habitats for migratory birds and other fish and wildlife in North America;

(2) to maintain current or improved distributions of migratory bird populations; and,

(3) to sustain an abundance of waterfowl and other migratory birds consistent with the goals of the North American Waterfowl Management plan and the international obligations contained in the migratory bird treaties and conventions and other agreements with Canada, Mexico, and other countries." 16 U.S.C. 4401 (North American Wetlands Conservation Act)."

NATIONAL WILDLIFE REFUGE SYSTEM MISSION: The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

DESCRIPTION OF USE: The proposed project consists of providing replacement right-of-way to the State of Arkansas through the Arkansas Highway and Transportation Department (AHTD) for the construction of new structures spanning the White River, Old River Lake, Roe Roe Bayou, and the St. Louis Southwestern Railroad on the White River National Wildlife Refuge (Refuge). An environmental assessment conducted as part of National Environmental Policy Act compliance by the Federal Highway Administration (FHWA) and the AHTD (Environmental Assessment AHTD Job Number 110123 FAP Number BRN-0048(12) White River & Relief Strs. & Apprs. (Clarendon) (Hwy. 79) Monroe, County Arkansas; approved February 29, 2000) and an accompanying Finding of No Significant Impact issued by FHWA December 20, 2006 demonstrated that there

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was no feasible and prudent alternative to the currently proposed location for the project on national wildlife refuge lands due to the fact that the current right-of-way for U.S. Hwy. 79 serves as the southern boundary of Cache River NWR and the northern boundary for White River NWR. The White River NWR boundary extends uninterrupted for over 50 miles to the south, making a southern avoidance alternative unfeasible. The Cache River NWR boundary extends uninterrupted for over 10 miles to the north with the exception of one small break in ownership approximately 5.5 miles north of the current location of Hwy. 79. However, this area is not suitable to bridge construction due to a sharp bend in the river that would cause navigation, engineering, and safety concerns.

The proposed project will consist of approximately 4.7 miles of construction on new alignment immediately south of the existing alignment with a roadway cross-section of two 12-foot lanes with eight-foot shoulders. The White River Bridge will provide a minimum of 52 feet clearance above the two percent flow line of 170 feet for the width of the proposed 283-foot wide channel span (between piers). This project will replace the existing roadway approaches and bridges over the White River, Old River Lake, and Roe Roe Bayou because these structures are functionally and structurally deficient and pose public safety concerns. The replacement structures will enable safe vehicular passage and improve the hydrological conditions for the Refuges due to increased elevated spans across the floodplain.

AVAILABILITY OF RESOURCES: All resources for the actual project costs will be provided by funds made available by the FHWA and the AHTD. Resources provided by the Service will include replacement right-of-way for the existing Hwy. 79 structures and approaches, and staff participation needed to process permits, monitor and ensure compliance with SUP conditions, and various other administrative tasks associated with the project.

ANTICIPATED IMPACTS OF THE USE: There are numerous negative impacts from construction of the proposed highway project that could potentially affect wildlife and/or their habitats on refuge lands. These include, but are not limited to, impacts to threatened or endangered species, migratory birds, forested wetlands and uplands, and other wildlife (black bear, white-tailed deer, turkey, small mammals). Public use impacts will also result from the proposed project. Positive impacts on aquatic and terrestrial habitats and associated fish and wildlife populations also will result from implementation of this project. These issues are addressed in the following paragraphs.

Threatened and Endangered Species

Three federally listed endangered species potentially occur within the project vicinity: the endangered pink mucket mussel (*Lampsilis abrupta*), the endangered fat pocketbook mussel (*Potamilus capax*), and the recently rediscovered Ivory-billed Woodpecker. The endangered plant pondberry (*Lindera melissafolia*) has been recorded from Monroe County but is not known to occur within the project action area. Extensive surveys for all endangered species revealed that none were present in the area of impact. A determination that the project was "not likely to adversely affect" any of the endangered species listed above was made by the FHWA and concurrence was issued by the Service

on June 21, 2006. Conditions ultimately will be improved for mussels as well other aquatic organisms because of enhanced hydrologic function and habitat restoration.

Migratory Birds

The primary purpose of the Refuges is migratory bird conservation, specifically waterfowl. Impacts to waterfowl and other birds such as neotropical migrants resulting from construction work will be in the forms of noise disturbance and destruction of habitat. Such impacts will occur over five to seven years of construction. Habitat restoration and enhanced management that will occur as a result of this project will provide potential long-term benefits to these species by increasing available habitat.

Forested Wetlands and Uplands

A total of 79 acres of forested and farmed wetlands and 0.8 acre of forested upland will be directly impacted through permanent conversion to right-of-way for the new alignment of Hwy. 79. However this loss will be countered by restoration of adjacent habitat and management of replacement habitat for wildlife values. Additional acreage may be temporarily impacted through construction of work roads, soil compaction, and interruption of floodplain flows.

Other Wildlife

Wildlife such as black bear, white-tailed deer, turkey, small mammals, and aquatic fauna will be affected during the course of the project as a result of habitat destruction, noise, and other disturbance associated with large scale construction projects. These disturbances may result in direct mortality or interruption in important life history aspects such as feeding or breeding. Removal of existing bridge superstructures and piers will likely result in minor, temporary, localized fish kills and death of other aquatic fauna such as freshwater mussels, turtles, etc.; however, overall conditions ultimately will be improved. Reclamation and restoration of former right-of-way could result in direct mortality of wildlife within the project area; however, the ultimate outcome will be a positive benefit to wildlife due to improved habitat conditions.

Public Use

Construction activities will occur over five to seven years in areas frequently accessed by the public for fishing, hunting, camping, and wildlife viewing. Noise and construction activity will negatively impact these public uses in portions of the project area at least periodically throughout the duration of the project. Reclamation of the historic borrow pits will eliminate popular fishing areas used by local anglers, but will provide long-term benefits to other users interested in hunting, or observing/photographing wildlife that will be attracted to habitats restored to a more natural (pre-construction) condition.

PUBLIC REVIEW AND COMMENT:

This Draft Compatibility Determination was available for comment from October 22, 2007 – November 21, 2007 through a local news release provided to the following newspapers: *Brinkley Argus, Daily Leader, Daily World, DeValls Bluff Times, Grand Prairie Herald, Monroe County Sun, Stuttgart Daily Leader, Times Herald, White River Delta Dispatch, White River Journal, and Woodruff County Monitor.* In addition, public

notices were printed in *Monroe County Sun and the Arkansas Democrat-Gazette.* Copies of the Proposed Draft Compatibility Determination were available for public review at White River NWR headquarters in St. Charles, Arkansas or Cache River NWR headquarters in Dixie, Arkansas. Copies of the Draft Compatibility Determination were requested and sent to Tricia Rogers of Clarendon and J.T. Davis of Roe. No comments were received by the close of comment period.

DETERMINATION (CHECK ONE BELOW):

_____ USE IS NOT COMPATIBLE

__X__ USE IS COMPATIBLE WITH THE FOLLOWING STIPULATIONS

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

1. Bridge Numbers 01253, B1253, and A1253 crossing White River, Old River Lake, and Roe Roe Bayou will be demolished and all resultant materials removed, the right-of-way will be restored to natural topography, and native hardwood vegetation will be re-established at these sites.

2. Borrow pits adjacent to the existing roadway fill sections will be restored to natural topography utilizing the existing roadway fill, and native hardwood vegetation will be re-established at these sites. A special provision will specifically direct the construction sequencing for filling of the borrow pits in order to minimize adverse impacts to aquatic resources during the restoration. As borrow pits are restored from east to west, passageways for fishes and other aquatic organisms will be maintained to allow retreat into Roe Roe Bayou.

3. Abandoned right-of-way that is legally entitled to the United States of America will be so deeded in fee title for incorporation into the Refuges.

4. Vehicular access for Refuge visitors will be provided to Roe Roe Bayou and the Refuges on both the east and west sides of the bayou.

5. Vehicular access, paved parking area to accommodate 20 vehicles and boat trailers, and a concrete boat ramp for use by Refuge visitors will be provided in the vicinity of the existing First Old River Lake boat ramp.

6. Property identified for reforestation in order to achieve enhanced hydrologic conditions on the Refuges as a result of two dimensional surface water velocity conditions described in Alternative 2 in Water-Resources Investigations Report 02-4256, and as subsequently defined by correspondence provided to the AHTD dated March 18, 2004 and June 17, 2005 will be acquired by AHTD. The portion required as replacement property for taking Refuge land will be provided to the United States in fee title. Any remaining property acquired by AHTD and not deeded to the United States will be

managed as part of the Refuges contingent on mutually acceptable Memorandum of Agreement between the responsible agencies.

7. Large "entering and leaving" refuge signs will be furnished and erected on the new highway right-of-way. Service personnel will be consulted concerning sign design.

8. Useable material from the project that is salvageable will be made accessible to the Service upon request for use on the Refuges. However, all material excess to the Service needs will be removed from the Refuges and properly disposed of off site.

9. AHTD will complete all necessary environmental, cultural resource, and other reviews and analyses, properly fulfill all public and agency coordination processes, and secure all required local, state, and federal permits prior to performing any construction activities on the Refuges.

JUSTIFICATION: The following justification(s) for the proposed project will be addressed in relation to the anticipated impacts of the use.

Threatened and Endangered Species

Surveys were conducted for three federally listed endangered species that potentially occur within the project vicinity: the pink mucket mussel (*Lampsilis abrupta*), the fat pocketbook mussel (*Potamilus capax*), and Ivory-billed Woodpecker. No specimens of any species were encountered. A determination that the project was "not likely to adversely affect" any of the endangered species listed above was made by the FHWA and concurrence was issued by the Service on June 21, 2006. Habitat for each species is present in the project area and could become occupied in the future. Short term impacts to available habitat will be offset by the benefits of habitat restoration that will occur as a result of the proposed project. Restoration of former right-of-way, acquisition of adjacent agricultural properties with subsequent reforestation, and substantially longer elevated spans for all bridges will improve hydrologic functions (as demonstrated by the U.S. Geological Survey Water-Resources Investigations Report 02-4256) that were disturbed by the historic project.

Migratory Birds

As discussed previously, negative short-term impacts to available habitat for migratory birds will be offset by the positive benefits of habitat restoration that will occur as a result of the proposed project. Also, acreage added to the Refuges as a result of the project will provide additional habit for migrating waterfowl and other species of migratory birds. More than 212 acres of current agricultural field will be reforested. Some of this will be deeded to the United States in fee title to be incorporated into the Refuges as replacement property, and the remainder acquired for flow velocity mitigation of impacts to fish and wildlife resources and will be made available for Service management through a formal Memorandum of Agreement. Management rights to the 320-acre AHTD Brushy Lake Wetland Mitigation Bank, which is adjacent to the project area and the White River NWR on the east side of the White River, will also be granted to the Service through

formal Memorandum of Agreement. In total, an additional 532.2 acres of habitat suitable for migratory birds will be made available for refuge management.

Forested Wetlands and Uplands

Forested and farmed wetlands that will be negatively impacted by the project will be mitigated through replacement lands and through Section 404 of the Clean Water Act compliance. A total of approximately 79.8 acres (west of White River) will be negatively impacted by the project. Of this acreage, 51.9 acres is Service property with 51.1 acres of wetlands and 0.8 acre of upland. The remaining 27.9 acres of private in-holdings are also delineated as farmed or forested wetlands. Approximately 212.2 acres (195 acres south of Hwy. 79 and 17.2 acres north of Hwy. 79) of farmed wetland within the area of impact will be added to the Refuges (either deeded in fee title or through management rights) and restored as replacement property or for mitigation purposes. Any additional wetland impacts will be debited from the 320-acre Brushy Lake Wetland Mitigation Bank. The relatively small amount of upland (0.8 acre) to be converted to right-of-way is negligible in the context of the Refuges resources.

Other Wildlife

Black bear, white-tailed deer, turkey, small mammals, and aquatic fauna that will be negatively affected as a result of the project will also receive some benefits. Longer elevated bridge spans around water bodies and in the Refuges floodplains will provide greater opportunity for wildlife passage through the area without the need to cross the roadway surface. Greater sight distances for motorists will help reduce wildlife mortality from vehicle strikes. Acreage added to the Refuges will provide additional habitat for the benefit of numerous species of wildlife, and improved hydrologic functions that result from the project will improve habitat for aquatic flora and fauna as well.

Public Use

Conditions of the current highway and bridge spans are obsolete, structurally deficient, and not up to current standards for safety of roadway users, including visitors to the Refuges. Bridge approach embankments are unstable, and the travel lanes and shoulders require frequent maintenance.. The project area serves as a major access artery to the Refuges and the completed project will result in increased safety and reduced risk of visitor injury or death. Following project construction, public access to Roe Roe Bayou and Old River Lake in particular will be safer and much improved due to wider shoulders, improved sight distances, safer ingress/egress points, new boat launches, and adequate parking areas.

Noise and construction activity will negatively impact most of the project area for public uses such as fishing, camping, and hunting at least periodically throughout the duration of the project. However, public access to all current facilities will be maintained throughout project construction. Additional acreage added to the Refuges will also provide hunting, fishing, and wildlife viewing opportunities to the public in areas not previously accessible due to private ownership. Restored areas will provide additional benefit to visitors seeking to engage in Priority Public Uses on the Refuges.

NEPA COMPLIANCE FOR REFUGE USE DECISION (check one below):

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X_ Environmental Assessment and Finding of No Significant Impact (FONSI)
The proposed project was evaluated in a February 29, 2000 Environmental Assessment and subsequent re-evaluation dated June 29, 2005 by the FHWA and the AHTD. The FONSI was issued by the FHWA on December 20, 2006.

_____ Environmental Impact Statement and Record of Decision

Signature: Refuge Manager: Jonathan Lindley 11/23/07
(Signature and Date)

Signature: Refuge Manager: Dennis W. Sharp 11/26/07
(Signature and Date)

REVIEW: REGIONAL COMPATIBILITY COORDINATOR Steve Seibert 12/6/07

Review: Refuge Supervisor: Heather Bowen 11/30/07
(Signature and Date)

Concurrence: Regional Chief: Jon Andrew 12-6-07
(Signature and Date)

MANDATORY RE-EVALUATION DATE (provide month and year):

_____ Mandatory 15-year Re-Evaluation Date (for priority public uses)

__X_ Mandatory 10-year Re-Evaluation Date (for all uses other than priority public uses)

Mandatory 10- or 15-year Re-evaluation Date: 12-06-2017

8

COMPATIBILITY DETERMINATION FOR REPLACEMENT OF COUNTY ROAD 51 BRIDGE OVER THE CACHE RIVER NEAR THE TOWN OF AMAGON IN JACKSON COUNTY, ARKANSAS

USE: Bridge replacement and minor expansion of existing right-of-way (ROW) to address public safety concerns – Jackson County Road 51, near Amagon, Arkansas.

REFUGE NAME: Cache River National Wildlife Refuge (Established in 1986)

ESTABLISHING AND ACQUISITION AUTHORITIES:
Emergency Wetlands Act; Migratory Bird Conservation Act; Fish and Wildlife Act of 1956

REFUGE PURPOSE:
"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act).

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and help to fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901 (b) (Emergency Wetlands Resources Act of 1986).

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources..." 16 U.S.C. 742f (a) (4) (Fish and Wildlife Act of 1956).

"... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. 742(b) (1) (Fish and Wildlife Act of 1956).

NATIONAL WILDLIFE REFUGE SYSTEM MISSION: The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

DESCRIPTION OF USE: The proposed project involves constructing a new bridge over the Cache River located on Jackson County Road 51, approximately 3 miles north of Highway 14 near the town of Amagon, Arkansas. The project involves removal and disposal of the existing bridge, reconstruction of approaches and construction of a new bridge, and is approximately 0.26 mile long. Existing Jackson County Road 51 consists of two nine-foot travel lanes with no shoulders. The existing Cache River Bridge is 16 feet wide, 207 feet long, and consists of timber plank decking supported by a timber substructure. The existing bridge is considered functionally obsolete by the Arkansas Highway and Transportation Department (AHTD) and represents a danger to public safety. No feasible alternative route exists for this roadway or river crossing.

The existing right of way along the route is 50 feet. The new roadway will consist of two ten-foot travel lanes with four-foot shoulders. The new bridge will consist of thirteen 31 foot continuous composite plate girder spans supported by concrete pile bents on concrete pilings. The structure will be built at the existing location and will be 27 feet wide and 406.6 feet long. The county road will be closed during construction, no detour will be provided. Two 54-inch diameter by 64-foot long steel culverts will be placed underneath the road to provide additional relief for high flows. Right-of-way will average 95 feet in width. The project will require approximately 2.17 acres of additional ROW, of which approximately 1.11 acres is located on Cache River National Wildlife Refuge (NWR). The duration of the project is expected to be approximately two years.

There are no cultural resources, endangered species, contaminant issues, or wellhead protection areas associated with this project. The entire project area is located within the Cache River floodplain and there is no practical alternative to avoid wetland impacts. Construction of this project is allowable under terms of a Section 404 of the Clean Water Act Nationwide Permit Number 23.

AVAILABILITY OF RESOURCES: All resources for the actual project costs will be provided by funds made available by Jackson County and AHTD. Resources provided by the Service will include approximately 1.11 acres of additional ROW to be granted as a permanent easement to AHTD, and staff participation needed to process permits and various other administrative tasks associated with the project.

ANTICIPATED IMPACTS OF THE USE: There are numerous impacts from construction of the proposed bridge replacement project which could potentially affect wildlife and/or their habitats on refuge lands. These include but are not limited to impacts to aquatic species, migratory birds, forested wetlands and uplands, and other wildlife. Public use impacts will also result from the proposed project.

Impacts to Fish and Wildlife Resources

There are no federally listed threatened or endangered species known to occur within the project vicinity. The project is located within an area which could potentially support the recently rediscovered Ivory-billed woodpecker (*Campephilus principalis*; IBWO). However, the suboptimal habitat within the project site (narrow wooded corridor surrounded by agricultural fields) and negative field surveys for IBWO make it unlikely that a project of this size would affect the species.

The primary purpose of the Cache River NWR is migratory bird conservation, specifically waterfowl. Impacts to waterfowl and other birds such as neotropical migrants resulting from construction work will be in the forms of noise disturbance and minimal alteration of habitat. Such impacts will be relatively short lived over the two year project duration.

Wildlife such as white-tailed deer, turkey, raptors, small mammals, reptiles and amphibians, and aquatic fauna could be affected as a result of habitat alteration,

equipment operation, noise, and other disturbance associated with bridge construction projects. This disturbance could result in direct mortality of smaller animals (e.g., herptiles, terrestrial and aquatic invertebrates), or interruption in important life history aspects such as feeding or breeding. Removal of the existing wooden bridge piers and decking should have minimal impact to fish and wildlife resources.

The project will require approximately 1.11 acres of additional ROW located on Cache River NWR. Additionally, 0.20 acres (0.10 hectares) will be impacted through temporary construction easements. Other minor secondary impacts may occur as a result of interrupted floodplain flows.

Impacts to Public Use

Construction activities will occur over a two year period in an area intermittently accessed by the public for fishing and hunting. No detour will be provided. The public access boat ramp near the project site will only be accessible from the east side of the river. Additionally, local farmers who frequently use the bridge will be forced to use alternative routes to cross the Cache River while undertaking day to day farming operations.

PUBLIC REVIEW AND COMMENT: This Draft Compatibility Determination was available for comment from March 21, 2008 – April 3, 2008 through a local news release provided to the following newspapers: *Brinkley Argus, Daily Citizen, Newport Daily Independent, and Woodruff County Monitor*. In addition, a public notice was printed in *the Arkansas Democrat-Gazette*. Copies of the Proposed Draft Compatibility Determination were available for public review at the Cache River NWR headquarters in Dixie, Arkansas. No comments or requested copies of the Draft Compatibility Determination were received by the close of comment period.

DETERMINATION (CHECK ONE BELOW):

_____ USE IS NOT COMPATIBLE

_X_ USE IS COMPATIBLE WITH THE FOLLOWING STIPULATIONS

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

1. Suitable replacement property will be provided at a location and in an amount deemed appropriate by the U.S. Fish and Wildlife Service (Service).

2. Work roads for the project will be constructed in a manner that minimizes site disturbance and allows unobstructed passage of boats or other watercraft through the project site on the Cache River.

JUSTIFICATION: The existing wooden bridge spanning the Cache River on Jackson County Road 51 is in a deteriorated condition, constitutes a risk to public safety, and needs to be replaced. The existing roadway embankment floods on a regular basis and serves as a source of undesirable sediment input into the Cache River. Hydrologic conditions will be improved by doubling the elevated portion of roadway and providing additional floodplain relief that will accommodate more natural flood flows. Sedimentation into the Cache River will be will be reduced because the road will be elevated to the 25-year flood level. The project will restore about 0.25 acre of the Cache River floodplain, and divert undesirable agricultural runoff from the main channel of the Cache River. The granting of a permanent easement by the Service on approximately 1.11 acres of Cache River NWR will be required to accomplish this project. Provision of suitable replacement property will be required and will result in a net gain of acreage to the refuge. Minor temporary impacts to fish and wildlife resources during construction will be offset by lasting environmental improvements that result from the project.

The proposed project will resolve critical public safety concerns by replacing a failed and unsafe bridge with a modern, safe structure. Use of County Road 51 and the Cache River bridge by local farmers, area residents, refuge staff, and visitors to Cache River NWR also will be greatly enhanced by the safety improvements resulting from the construction of the new bridge and an improved roadway that will not be subjected to the hazards of frequent flooding. Additionally, a by-product of the project will be the upgrading (by Jackson County) of an existing primitive dirt boat ramp at the site to a concrete high-water boat ramp that will be used by refuge visitors to access Cache River NWR and conduct priority public uses. The project will not result in increased burden on refuge financial or staff resources and will be manageable given expected budget and staff levels.

MANDATORY RE-EVALUATION DATE (provide month and year): April 2018

_____ Mandatory 15-year Re-Evaluation Date (for priority public uses)

__X__ Mandatory 10-year Re-Evaluation Date (for all uses other than priority public uses)

NEPA COMPLIANCE FOR REFUGE USE DECISION (check one below):

_____ Categorical Exclusion without Environmental Action Statement

__X__ Categorical Exclusion and Environmental Action Statement

_____ Environmental Assessment and Finding of No Significant Impact (FONSI)

_____ Environmental Impact Statement and Record of Decision

4

Signature: **Refuge Manager:** _____ 4/9/08
(Signature and Date)

Review: **Refuge Supervisor:** _____ 4/11/08
(Signature and Date)

Concurrence: **Regional Chief:** _____ 4-14-08
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date: April 2018

5

COMPATIBILITY DETERMINATION

USE: Gas pipeline relocation to accommodate the Arkansas Highway and Transportation Department's bridge replacement project to address public safety concerns – Jackson County Road 51, near Amagon, Arkansas.

REFUGE NAME: Cache River National Wildlife Refuge (Established in 1986)

ESTABLISHING AND ACQUISITION AUTHORITIES:
Emergency Wetlands Act; Migratory Bird Conservation Act; Fish and Wildlife Act of 1956

REFUGE PURPOSE:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act).

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and help to fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901 (b) (Emergency Wetlands Resources Act of 1986).

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources..." 16 U.S.C. 742f (a) (4) (Fish and Wildlife Act of 1956).

"... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. 742(b) (1) (Fish and Wildlife Act of 1956).

NATIONAL WILDLIFE REFUGE SYSTEM MISSION: The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

DESCRIPTION OF USE: CenterPoint Energy proposes to relocate approximately 850 feet of 4-inch-diameter below ground, plastic natural gas distribution pipeline to accommodate the Arkansas Highway and Transportation Department's (AHTD) construction of a new bridge over the Cache River located on Jackson County Road 51. The existing bridge is considered functionally obsolete by AHTD and represents a danger to public safety. CenterPoint Energy's pipeline relocation activities are necessary to accommodate construction of the new bridge. CenterPoint Energy's existing pipeline is located where the new bridge's structure footing will be placed; therefore it must be relocated. The relocation of the distribution pipeline is required

1

for the bridge to meet Department of Transportation regulations. No feasible alternative route exists for this river crossing.

The existing pipeline will be abandoned in place and new pipe will be installed 24 feet east of the centerline of Jackson County Road 51 and installed at a depth of 4 feet underneath the Cache River by using a low-impact pipeline installation technique - the Horizontal Direction Drill (HDD) Method. The HDD method allows for trenchless construction across an area by drilling a hole under the waterbody and installing a prefabricated segment of pipe through the hole, thereby minimizing surface, ground, aquatic, and subterranean disturbance to the surface of the right-of-way and to the waterbody proper. More specifically, the use of the HDD method will avoid direct impacts to the bed and banks of the Cache River and will minimize impacts within the Cache River National Wildlife Refuge (NWR). All ground disturbance activities associated with this project will occur within the existing road way right-of-way.

Three temporary workspace areas located within the existing Jackson County Road 51 right-of-way will be used for this project. Two 6' x 6' x 6'temporary workspaces will be located within the boundaries of the Cache River NWR and one 6' x 6' x 6' temporary workspace area will be located outside the Cache River NWR – all will be located on the existing gravel road (Jackson County Road 51). These workspaces will be use to drill the entry hole, insert the pipeline, which will be steered and monitored underground as to precise depth and course, until it emerges from the exit hole.

There are no cultural resources, endangered species, contaminant issues, or wellhead protection areas associated with this project. No floodplains, waterbodies, or wetlands will be impacted from project activities.

AVAILABILITY OF RESOURCES: All resources for the pipeline relocation will be provided by CenterPoint. No additional resources will be needed for this project.

ANTICIPATED IMPACTS OF THE USE: There are minimal to no impacts from the relocation of the proposed distribution pipeline on wildlife and/or their habitats on refuge lands. All ground disturbance activities will located within the existing roadway right-of-way and be temporary in nature. The project area will be restored to pre-construction contours and no permanent surface impacts will occur as a result of the proposed project. Public use impacts will not result from the proposed project.

Impacts to Fish and Wildlife Resources

There are no federally listed threatened or endangered species known to occur within the project vicinity. The project is located near an area that could potentially support the recently rediscovered Ivory-billed woodpecker (*Campephilus principalis*). However, the suboptimal habitat within the project site (narrow corridor surrounded by agricultural fields) makes it unlikely that a project of this size would adversely affect the species.

2

The primary purpose of the Cache River NWR is migratory bird conservation, specifically waterfowl. Impacts to waterfowl and other birds such as neotropical migrants resulting from construction work will be in the forms of equipment operation and noise disturbance. Such impacts will be relatively short lived over the duration of the project, which is expected to be completed in three or four days.

Wildlife such as white-tailed deer, turkey, raptors, small mammals, reptiles and amphibians, and invertebrates could be minimally affected as a result of equipment operation and noise associated with gas pipeline relocation project.

Project activities will occur within the existing roadway right-of-way, no habitat alteration will occur from project activities. The project will temporarily impact approximately 0.003 acre. The project area will be restored to pre-construction contours and no permanent surface impacts will occur as a result of the proposed project.

Impacts to Public Use

Public use impacts will not result from the proposed project. Project activities will be completed within four days and wholly contained within the existing right-of-way of County Road 51.

PUBLIC REVIEW AND COMMENT: This Draft Compatibility Determination was available for public review and comment for seven days beginning October 15, 2008, through a local news release provided to the following newspapers: *Brinkley Argus, Daily Citizen,* and *Woodruff County Monitor.* In addition, a public notice was printed in *Newport Daily Independent,* and the *Arkansas Democrat-Gazette.* Copies of the Draft Compatibility Determination were available for public review at the Cache River NWR headquarters in Dixie, Arkansas. Copies of the draft were available by contacting the Cache River NWR headquarters by phone, mail, fax, or email. Comment period closed October 22, 2008, with no comments received.

Additionally, a notice in the *Federal Register* will be published notifying all interested parties and the public of the Service's consideration of a ROW permit request for installation of this pipeline.

DETERMINATION (CHECK ONE BELOW):

_____ **USE IS NOT COMPATIBLE**

__X__ **USE IS COMPATIBLE WITH THE FOLLOWING STIPULATIONS**

3

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

1. Bore pits will be located wholly within the graveled surface of Jackson County Road 51. Operations will be conducted in a manner that minimizes risks to the public, wildlife, and habitat.

2. The new gas pipeline will be installed at a minimum depth of four feet beneath the river bed of the Cache River.

3. Exact location of the course of the new gas pipeline will be provided to the Cache River NWR Refuge Manager.

JUSTIFICATION: The relocation of the gas distribution pipeline is required to accommodate the replacement of the bridge over the Cache River located on Jackson County Road 51 to safely be constructed to Department of Transportation regulations. No feasible alternative route exists for this river crossing. The existing pipeline will be abandoned in place and the new line relocated 24 feet east of the centerline of County Road 51 and installed at a depth of 4 feet underneath the Cache River by using a low-impact pipeline installation technique, the HDD Method. The HDD method allows for trenchless construction across an area by drilling a hole under the waterbody and installing a prefabricated segment of pipe through the hole, thereby avoiding disturbance to the surface of the right-of-way and to the waterbody proper. More specifically, the use of this method will avoid direct impacts to the bed and banks of the Cache River and minimize impacts within the Cache River NWR. All ground disturbance activities associated with this project will occur within the existing gravel road surface and be temporary in nature. The project will temporarily impact approximately 0.003 acre. The project area will be restored to pre-construction contours and no permanent surface impacts will occur as a result of the proposed project.

Minor temporary impacts to fish and wildlife resources may occur during construction in the form of noise disturbance or activities associated with the operations. Such impacts will be relatively short lived over the three to four day project duration. The project will allow for the proposed bridge to be safely constructed and will not result in increased burden on NWR financial or staff resources and will be manageable given expected budget and staff levels.

4

MANDATORY RE-EVALUATION DATE (provide month and year): October 2018

_____ Mandatory 15-year Re-Evaluation Date (for priority public uses)

__X__ Mandatory 10-year Re-Evaluation Date (for all uses other than priority public uses)

NEPA COMPLIANCE FOR REFUGE USE DECISION (check one below):

_____ Categorical Exclusion without Environmental Action Statement

__X__ Categorical Exclusion and Environmental Action Statement

_____ Environmental Assessment and Finding of No Significant Impact (FONSI)

_____ Environmental Impact Statement and Record of Decision

Signature: Refuge Manager: _____ 10/22/08
(Signature and Date)

Review: Compatibility Coordinator: _____ 10/23/08
(Signature and Date)

Review: Refuge Supervisor: _____ 10/24/08
(Signature and Date)

Concurrence: Acting Regional Chief: _____ 10/24/08
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date: __April 2018_____

5

Appendix F. Intra-Service Section 7 Biological Evaluation

REGION 4
INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

[Note: This form provides the outline of information needed for intra-Service consultation. If additional space is needed, attach additional sheets, or set up this form to accommodate your responses.]

Originating Person: Keith Weaver
Telephone Number: 870-347-2074 **E-Mail:** keith_weaver@fws.gov
Date: November 3, 2008

PROJECT NAME (Grant Title/Number):
CCP for the Central Arkansas NWR Complex

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:
n/a

III. Station Name:
Bald Knob National Wildlife Refuge

IV. Description of Proposed Action (attach additional pages as needed):

The subject action would result in the implementation of the Preferred Alternative developed for the Comprehensive Conservation Plan for the Central Arkansas National Wildlife Complex, which includes the 15,022-acre Bald Knob National Wildlife Refuge (Refuge) in White County, Arkansas. This action would result in enhanced management and administration of the Refuge in fulfillment of the establishing purposes for the Refuge, which are:

"…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. ¤ 3901(b) (Emergency Wetlands Resources Act of 1986)

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

"…for use as an inviolate sanctuary, or for any other management purposes, for migratory birds." 16 U.S.C. ¤ 715d (Migratory Bird Conservation Act).

Management of the Refuge would be guided by the Preferred Alternative over the next 15 years in the broad areas of Fish and Wildlife Population Management, Habitat Management, Resource Protection, Visitor Services, and Administration. Within these focal areas detailed goals, objectives, and strategies have been developed to fulfill Refuge purposes, comply with laws, regulations, and policies (including the protection of listed species), support regional and national plans and initiatives in conjunction with numerous partners such as Arkansas Game and Fish Commission, and consider public needs and benefits. See attached Comprehensive Conservation Plan and Environmental Assessment for detailed description of the Preferred Alternative.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map: Due to the transient nature of piping plover and least tem use on the refuge, a map indicating occurrence is not available

B. Complete the following table:

SPECIES/CRITICAL HABITAT	STATUS[1]
Interior Least Tern (*Sterna antillarum*)	E
Piping Plover (*Charadrius melodus)*	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 (map attached):

A. Ecoregion Number and Name:
Ecosystem Area I, Ecosystem 27: Lower Mississippi River Ecosystem

B. County and State:
White County, Arkansas.

C. Section, township, and range (or latitude and longitude): Section 6, T7N, R5W

D. Distance (miles) and direction to nearest town: 3 miles N to Bald Knob, AR

E. Species/habitat occurrence:

Interior Least Tern: Interior least tem occurs infrequently and for short durations (1-2 days) on the refuge, using mudflats, irrigation canals, and other wetlands for foraging. Least Tern presence on the refuge is similar to the Piping Plover with occurrences documented in late summer. Breeding does occur in Arkansas but is limited to large river systems such as the Arkansas, Red and Mississippi Rivers.

Piping Plover: The plover is a transient migrant that utilizes mudflats and shallowly-flooded wetlands on the refuge during the spring and late summer months. Occurrences are infrequent and of short duration (1-2 days). Breeding occurs along the Atlantic coast from North Carolina to southern Canada and along rivers and wetlands of the northern Great Plains from Nebraska to the southern Prairie Provinces. Plover use on the refuge occurs on mud flats that are created in June-

September from fields that were planted in rice the previous year. Only these fields are managed for shorebirds, however shorebirds may also occur on other croplands and wetlands on the refuge such as ditches, canals, etc.

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
Interior Least Tern	Limited occurrence on Bald Knob NWR. Proposed management activities will enhance refuge habitat and foraging areas. Potential nesting sites will not likely be impacted by the proposed actions.
Piping Plover	Limited occurrence on Bald Knob NWR. Proposed management activities will enhance refuge habitat and foraging areas. Potential nesting sites will not likely be impacted by the proposed actions.

VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitats in item V. B (attach additional pages as needed):

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

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
Interior Least Tern	Habitats potentially used by this species are not slated for active management. Additional mudflat and shallow water acreage may be created in the future where appropriate. Ownership and law enforcement are key elements to protection of this species and its habitats.
Piping Plover	Habitats potentially used by this species are not slated for active management. Additional mudflat and shallow water acreage may be created in the future where appropriate. Ownership and law enforcement are key elements to protection of this species and its habitats.

VIII. Effect Determination and Response Requested:

SPECIES/ CRITICAL HABITAT	DETERMINATION[1]			RESPONSE[1] REQUESTED
	NE	NA	AA	
Least Tern		X		Concurrence

SPECIES/ CRITICAL HABITAT	DETERMINATION[1]			RESPONSE[1] REQUESTED
	NE	NA	AA	
Piping Plover		X		Concurrence

[1]DETERMINATION/RESPONSE REQUESTED:

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a "Concurrence" is recommended for a complete Administrative Record.

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a "Concurrence".

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested for listed species is "Formal Consultation". Response Requested for proposed or candidate species is "Conference".

signature (originating station) **date** 12/10/08

Project Leader

title

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence X **Nonconcurrence** _____

B. Formal consultation required _____

C. Conference required _____

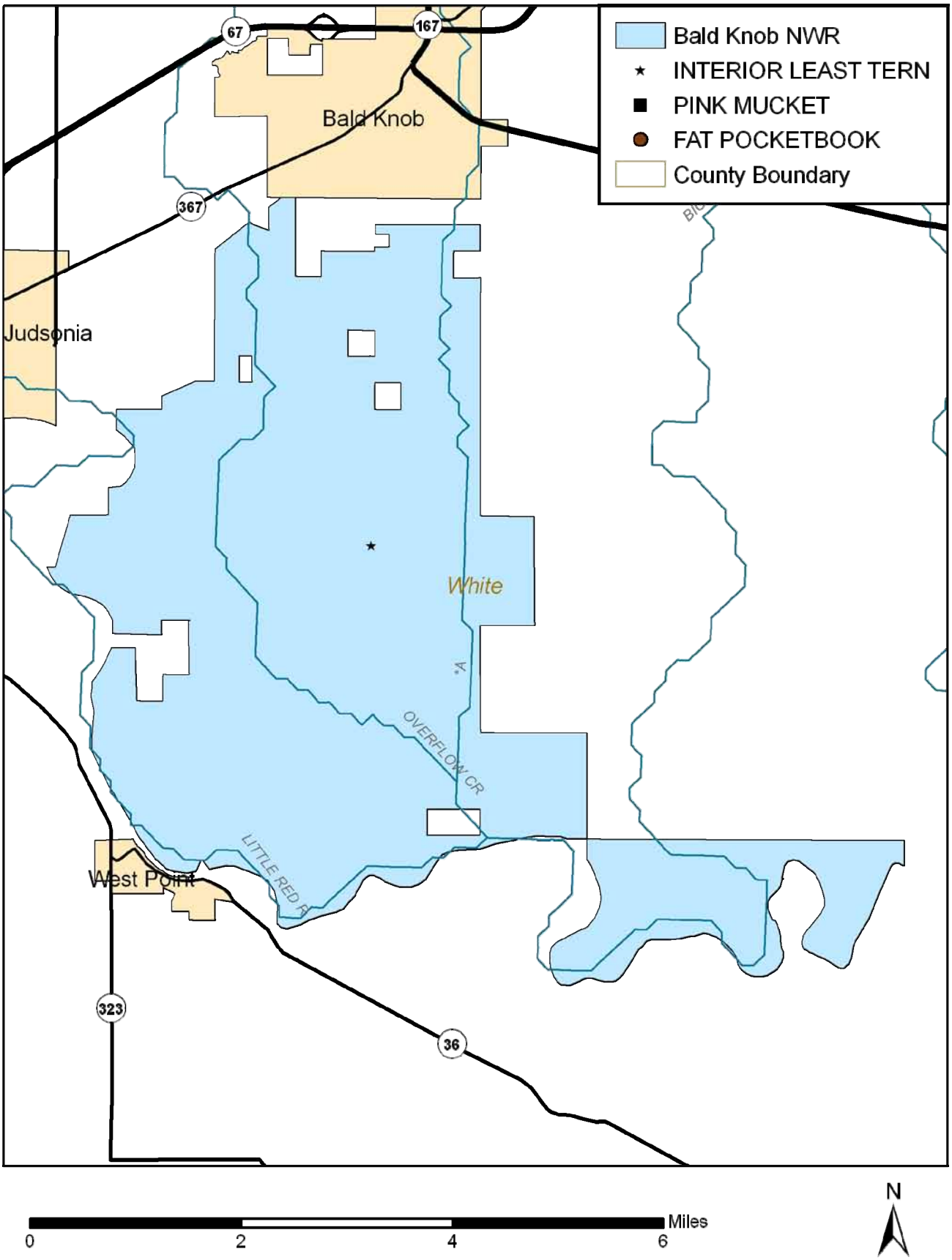
D. Informal conference required _____

E. Remarks (attach additional pages as needed):

signature **date** 12/10/08

Field Supervisor AR ES FO

title **office**


Bald Knob NWR
INTERIOR LEAST TERN
PINK MUCKET
FAT POCKETBOOK
County Boundary
67
167
Bald Knob
367
Judsonia
White
OVERFLOW CR
LITTLE RED R
West Point
323
36
Miles
0
2
4
6
N

REGION 4
INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

[Note: This form provides the outline of information needed for intra-Service consultation. If additional space is needed, attach additional sheets, or set up this form to accommodate your responses.]

Originating Person: Keith Weaver
Telephone Number: 870-347-2074 **E-Mail:** keith_weaver@fws.gov
Date: November 3, 2008

PROJECT NAME (Grant Title/Number):
CCP for the Central Arkansas NWR Complex m

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:
n/a

III. Station Name:
Big Lake National Wildlife Refuge

IV. Description of Proposed Action (attach additional pages as needed):

Description of the Proposed Action:

The subject action would result in the implementation of the Preferred Alternative developed for the Comprehensive Conservation Plan for the Central Arkansas National Wildlife Complex, which includes the 11,038-acre Big Lake National Wildlife Refuge (Refuge) in Mississippi County, Arkansas. This action would result in enhanced management and administration of the Refuge in fulfillment of the establishing purposes for the Refuge, which are:

"…as a refuge, reserve and breeding ground for native birds" (Executive Order 2230, dated August 2, 1915.

"…for use as an inviolate sanctuary, or for any other management purposes, for migratory birds 16 U.S.C. ¤ 715d (Migratory Bird Conservation Act).

Management of the Refuge would be guided by the Preferred Alternative over the next 15 years in the broad areas of Fish and Wildlife Population Management, Habitat Management, Resourc Protection, Visitor Services, and Administration. Within these focal areas detailed goals, objectives, and strategies have been developed to fulfill Refuge purposes, comply with laws,

regulations, and policies (including the protection of listed species), support regional and national plans and initiatives in conjunction with numerous partners such as Arkansas Game and Fish Commission, and consider public needs and benefits. See attached Comprehensive Conservation Plan and Environmental Assessment for detailed description of the Preferred Alternative.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map:

B. Complete the following table:

SPECIES/CRITICAL HABITAT	STATUS[1]
Fat Pocketbook *(Potamilus capax)*	E

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

VI. Location (map attached):

A. Ecoregion Number and Name:
Ecosystem Area I, Ecosystem 27: Mississippi Alluvial Valley

B. County and State:
Mississippi, Craighead, Lawrence, and Greene Counties, Arkansas.

C. Section, township, and range (or latitude and longitude):
Main refuge is located in R9E, T14N & T15N, also one tract in R3E, T17N, and another tract in R3R2E, T18N

D. Distance (miles) and direction to nearest town:
The refuge is located 3 miles west of Manila, Arkansas on Hwy 18. One additional tract is located 1.5 miles west of Hwy 349 approximately 4.5 miles west of Jonesboro, Arkansas and another is located 0.5 miles north of County Rd 216 5 miles north of Light, Arkansas.

E. Species/habitat occurrence:

Fat Pocketbook – The fat pocketbook mussel inhabits the Little River System and has been found in Big Lake NWR and also juveniles were restocked in 2000.

VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitats in item V. B (attach additional pages as needed):

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
Fat Pocketbook	Proposed management activities will improve water quality through sound forest management and hydrologic restoration; public use, research, and other proposed activities will likely have no impact to the aquatic habitat. Efforts to fortify Ditch 81, modify/replace water control structures, or remove sediment from Big Lake or adjacent ditches may result in negative impacts to the Fat Pocketbook.

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

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
Fat Pocketbook	State Best Management Practices will be followed for silvicultural operations. Refuge ownership and therefore management and law enforcement will ensure protection of this species and its habitats. Any bank armoring, water structure modification/replacement, or sediment removal projects will incorporate mussel surveys as deemed appropriate in coordination with the Arkansas Field Office (Ecological Services).

VIII. Effect Determination and Response Requested:

SPECIES/ CRITICAL HABITAT	DETERMINATION[1]			RESPONSE[1] REQUESTED
	NE	NA	AA	
Fat Pocketbook		X		Concurrence

[1]DETERMINATION/RESPONSE REQUESTED:

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a "Concurrence" is recommended for a complete Administrative Record.

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a "Concurrence".

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or

designated/proposed critical habitat. Response Requested for listed species is "Formal Consultation". Response Requested for proposed or candidate species is "Conference".

_____ 12/10/08
signature (originating station) **date**

Project Leader
title

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence X **Nonconcurrence** _____

B. Formal consultation required _____

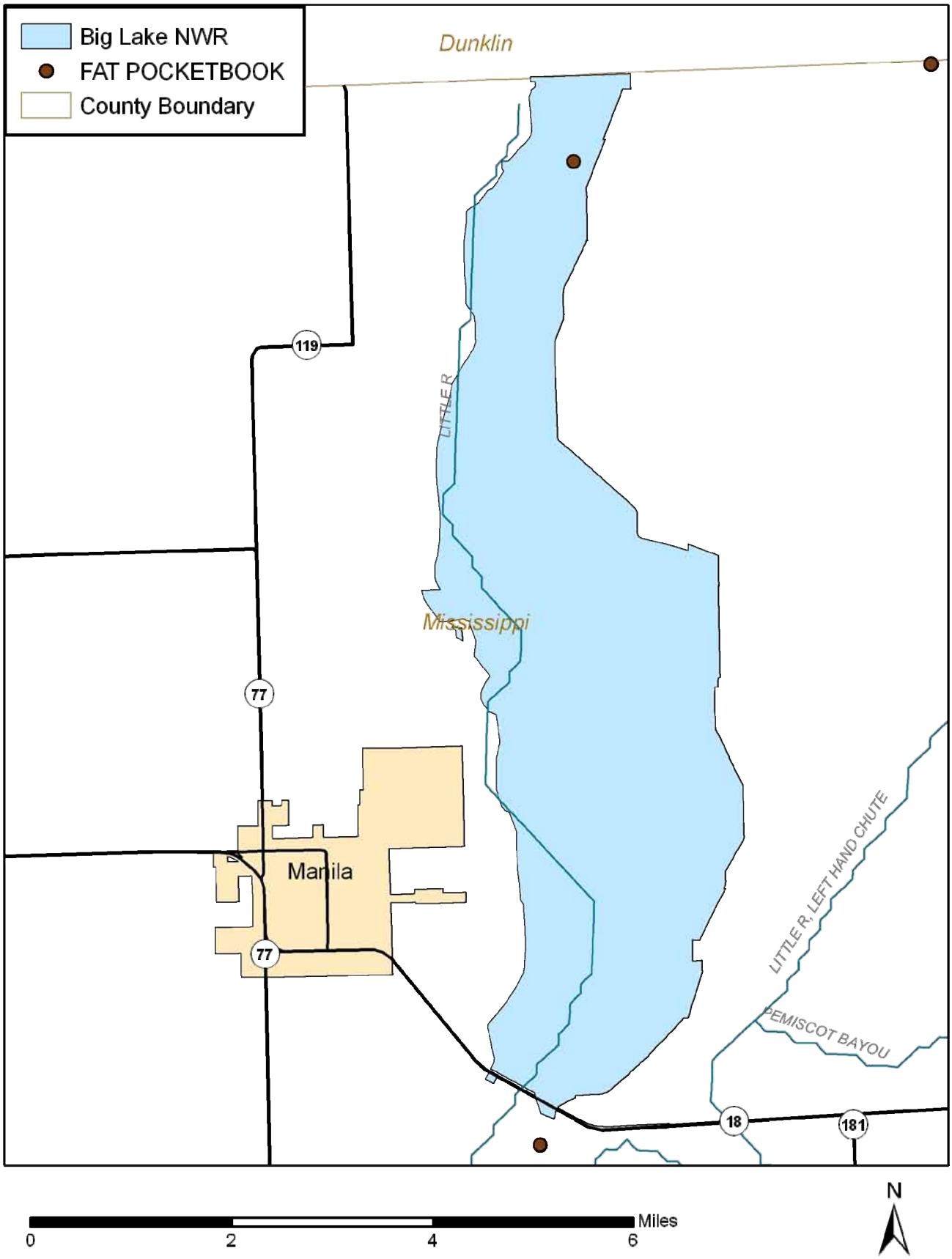
C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

_____ 12/10/08
signature **date**

Field Supervisor ARESFO
title **office**


Big Lake NWR
FAT POCKETBOOK
County Boundary
Dunklin
119
LITTLE R
Mississippi
77
Manila
77
LITTLE R, LEFT HAND CHUTE
PEMISCOT BAYOU
18
181
Miles
0
2
4
6
N

REGION 4
INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

[Note: This form provides the outline of information needed for intra-Service consultation. If additional space is needed, attach additional sheets, or set up this form to accommodate your responses.]

Originating Person: Keith Weaver
Telephone Number: 870-347-2074 **E-Mail:** keith_weaver@fws.gov
Date: November 3, 2008

PROJECT NAME (Grant Title/Number):
CCP for the Central Arkansas NWR Complex m

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:
n/a

III. Station Name:
Cache River National Wildlife Refuge

IV. Description of Proposed Action (attach additional pages as needed):

Description of the Proposed Action:

The subject action would result in the implementation of the Preferred Alternative developed for the Comprehensive Conservation Plan for the Central Arkansas National Wildlife Complex, which includes the 66,000-acre Cache River National Wildlife Refuge (Refuge) in Jackson, Monroe, Prairie, and Woodruff Counties, Arkansas. This action would result in enhanced management and administration of the Refuge in fulfillment of the establishing purposes for the Refuge, which are:

"…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. ¤ 3901(b) (Emergency Wetlands Resources Act of 1986)

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

"…for use as an inviolate sanctuary, or for any other management purposes, for migratory birds." 16 U.S.C. ¤ 715d (Migratory Bird Conservation Act).

Management of the Refuge would be guided by the Preferred Alternative over the next 15 years in the broad areas of Fish and Wildlife Population Management, Habitat Management, Resource Protection, Visitor Services, and Administration. Within these focal areas detailed goals, objectives, and strategies have been developed to fulfill Refuge purposes, comply with laws, regulations, and policies (including the protection of listed species), support regional and national plans and initiatives in conjunction with numerous partners such as Arkansas Game and Fish Commission, and consider public needs and benefits. See attached Comprehensive Conservation Plan and Environmental Assessment for detailed description of the Preferred Alternative.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map:

B. Complete the following table:

SPECIES/CRITICAL HABITAT	STATUS[1]
Ivory-billed Woodpecker (*Campephilus principalis*)	E
Interior Least Tern (*Sterna antillarum*)	E
Pink Mucket *(Lampsilis abrupta)*	E
Fat Pocketbook *(Potamilus capax)*	E

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

VI. Location (map attached):

A. Ecoregion Number and Name:
Ecosystem Area I, Ecosystem 27: Mississippi Alluvial Valley

B. County and State:
Woodruff, Jackson, Monroe, and Prairie Counties, Arkansas.

C. Section, township, and range (or latitude and longitude):
Various holdings in T1N R3W, T1N R4W, T2N R3W, T2N R4W, T3N R2W, T3N R3W, T3N R4W, T4N R2W, T4N R3W, T4N R4W, T5N R2W, T5N R3W, T5N R4W, T6N R2W, T6N R3W, T7N R1W, T7N R2W, T7N R3W, T8N R1W, T8N R2W, T8N R3W, T9N R1W, T9N R2W, T10N R1W, T11N R1W, of the 5th Principal Meridian.

D. Distance (miles) and direction to nearest town:
See maps. Large holdings of Cache River NWR are 1 mile northwest of Clarendon, 2 miles southeast of Biscoe, 3 miles north of Brasfield, 7 miles southwest of Brinkley, 1mile east of Dixie, and 4 miles southwest of McCrory, Arkansas.

E. Species/habitat occurrence:

Ivory-billed Woodpecker (IBWO) - The IBWO was once an inhabitant of forested habitats throughout the southeastern United States and Cuba. Although little specific population data are available, it is likely that European settlement and the clearing of the forest caused the species to decline in the latter half of the 19th century. By the mid-20th century the IBWO was reduced to a very small population. The most famous of these birds were those studied by Arthur Allen and James Tanner at the Tensas River in Louisiana in the late 1930s. The last widely accepted sightings were made in the Tensas area by Don Eckleberry in 1944. Since that time there have been numerous unconfirmed sightings throughout the historic range of the species. Many of these sightings seemed highly credible but lacked hard evidence.

In February of 2004, Cornell Laboratory of Ornithology biologists became aware of credible sight reports of the IBWO in a portion of Bayou DeView which is located on Cache River National Wildlife Refuge. Subsequently, Cornell biologists and their partners documented the presence of at least one IBWO (Fitzpatrick *et al.* 2005) in that area.

This stretch of the Bayou De View is currently providing some or all of the life cycle requirements for this species proliferation. The sixteen sightings of the IBWO were documented deep within the cypress-tupelo swamp of the Bayou De View (now part of the managed access area [MAA]). Searchers deployed recording units within this area to capture the double taps and kent calls by this species. These vocalizations are the communication tools that the IBWO uses throughout the day. Much of this information from the recording units is still being analyzed.

Interior Least Tern – Interior least terns have been observed foraging intermittently in shore bird areas on Bald Knob NWR and the Raft Creek Bottoms along the White River.

Pink Mucket – The pink mucket pearly mussel inhabits the White River and its major tributaries; one specimen was tentatively identified in the Cache River.

Fat Pocketbook – The fat pocketbook mussel inhabits the White River and has been found in other streams but has not been found in the Cache River on any recent surveys.

VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitats in item V. B (attach additional pages as needed):

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
Ivory-billed Woodpecker	Extent of occurrence on Cache River NWR is unknown. Proposed management activities such as reforestation, land acquisition, and hydrologic restoration will connect and create large forest blocks and improve the ecosystem. Improvements cuts to forest habitat will be short-term disturbances, but will improve forest structure, composition, productivity, and sustainability of habitat for the long-term. Public use, research, and other proposed activities are low volume and low impact.

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
Interior Least Tern	Limited occurrence on Cache River NWR. Proposed management activities will improve refuge habitat overall; foraging areas and potential nesting sites will not likely be impacted by the proposed actions.
Pink Mucket	Limited occurrence in White River and possibly in Cache River. Proposed management activities will improve water quality through sound forest management, reforestation, and hydrologic restoration; public use, research, and other proposed activities will likely have no impact to the aquatic habitat.
Fat Pocketbook	Limited occurrence in White River and not recently found in the Cache River. Proposed management activities will improve water quality through sound forest management, reforestation, and hydrologic restoration; public use, research, and other proposed activities will likely have no impact to the aquatic habitat.

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

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
Ivory-billed Woodpecker	Surveys to determine potential use of an area by this species are conducted prior to any habitat manipulation. Close coordination with Ecological Services and the Regional Office continues to ensure protection and proper management for this species.
Interior Least Tern	Habitats potentially used by this species are not slated for active management. Ownership and law enforcement are key elements to protection of this species and its habitats.
Pink Mucket	State Best Management Practices will be followed for silvicultural operations. Refuge ownership and therefore management and law enforcement will ensure protection of this species and its habitats.
Fat Pocketbook	State Best Management Practices will be followed for silvicultural operations. Refuge ownership and therefore management and law enforcement will ensure protection of this species and its habitats.

VIII. Effect Determination and Response Requested:

SPECIES/ CRITICAL HABITAT	DETERMINATION[1]			RESPONSE[1] REQUESTED
	NE	NA	AA	
Ivory-billed Woodpecker		X		Concurrence
Interior Least Tern		X		Concurrence
Pink Mucket		X		Concurrence
Fat Pocketbook		X		Concurrence

[1]DETERMINATION/RESPONSE REQUESTED:

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a "Concurrence" is recommended for a complete Administrative Record.

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a "Concurrence".

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested for listed species is "Formal Consultation". Response Requested for proposed or candidate species is "Conference".

signature (originating station) **date** 12/10/08

Project Leader
title

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence X **Nonconcurrence** _____

B. Formal consultation required _____

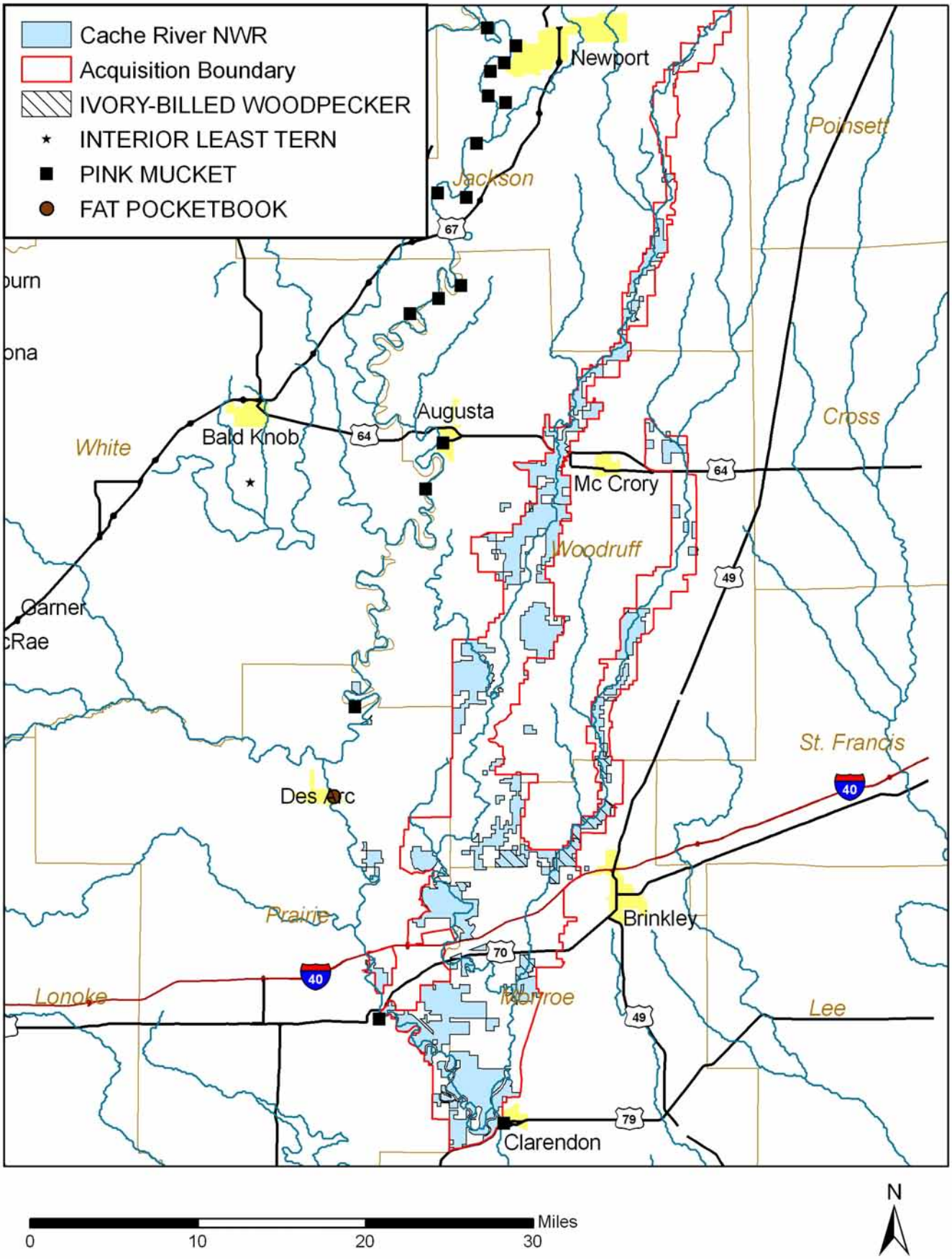
C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

signature **date** 12/10/08

Field Supervisor **title** AR ES FO **office**


Cache River NWR
Acquisition Boundary
IVORY-BILLED WOODPECKER
INTERIOR LEAST TERN
PINK MUCKET
FAT POCKETBOOK
Newport
Jackson
Poinsett
Cross
White
Bald Knob
Augusta
Mc Crory
Woodruff
Garner
St. Francis
Des Arc
Prairie
Brinkley
Lonoke
Monroe
Lee
Clarendon
67
64
49
40
70
79
Miles
0
10
20
30
N

REGION 4

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

[Note: This form provides the outline of information needed for intra-Service consultation. If additional space is needed, attach additional sheets, or set up this form to accommodate your responses.]

Originating Person: Keith Weaver
Telephone Number: 870-347-2074 **E-Mail:** keith_weaver@fws.gov
Date: 11/5/08

PROJECT NAME (Grant Title/Number):

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:

n/a

III. Station Name: Wapanocca NWR

IV. Description of Proposed Action (attach additional pages as needed):

The subject action would result in the implementation of the Preferred Alternative developed for the Comprehensive Conservation Plan for the Central Arkansas National Wildlife Complex, which includes the 5,484-acre Wapanocca National Wildlife Refuge (Refuge) in Crittendon County, Arkansas. This action would result in enhanced management and administration of the Refuge in fulfillment of the establishing purpose for the Refuge, which is:

"…for use as an inviolate sanctuary, or for any other management purposes, for migratory birds." 16 U.S.C. ¤ 715d (Migratory Bird Conservation Act).

Management of the Refuge would be guided by the Preferred Alternative over the next 15 years in the broad areas of Fish and Wildlife Population Management, Habitat Management, Resource Protection, Visitor Services, and Administration. Within these focal areas detailed goals, objectives, and strategies have been developed to fulfill Refuge purposes, comply with laws, regulations, and policies (including the protection of listed species), support regional and national plans and initiatives in conjunction with numerous partners such as Arkansas Game and Fish Commission, and consider public

needs and benefits. See attached Comprehensive Conservation Plan and Environmental Assessment for detailed description of the Preferred Alternative.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map:

B. Complete the following table:

SPECIES/CRITICAL HABITAT	STATUS[1]
NONE	N/A

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

VI. Location (map attached):

A. Ecoregion Number and Name:
Ecosystem Area I, Ecosystem 27: Mississippi Alluvial Valley

B. County and State: Crittenden County, Arkansas

C. Section, township, and range (or latitude and longitude): Sections 1,2,3,4,9,10,11,12, Township 8 North, Sections 28,33,34,35, Township 9 North, Range 8 East

D. Distance (miles) and direction to nearest town: Borders Turrell, Arkansas, North boundary.

E. Species/habitat occurrence: N/A

VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitats in item (attach additional pages as needed):

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
NONE	N/A

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

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
NONE	N/A

VIII. Effect Determination and Response Requested:

SPECIES/ CRITICAL HABITAT	DETERMINATION[1]			RESPONSE[1] REQUESTED
	NE	NA	AA	
NONE	X			Concurrence

[1]DETERMINATION/RESPONSE REQUESTED:

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a "Concurrence" is recommended for a complete Administrative Record.

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a "Concurrence".

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested for listed species is "Formal Consultation". Response Requested for proposed or candidate species is "Conference".

signature (originating station) 12/10/08 date

Project Leader
title

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence X Nonconcurrence _____

B. Formal consultation required _____

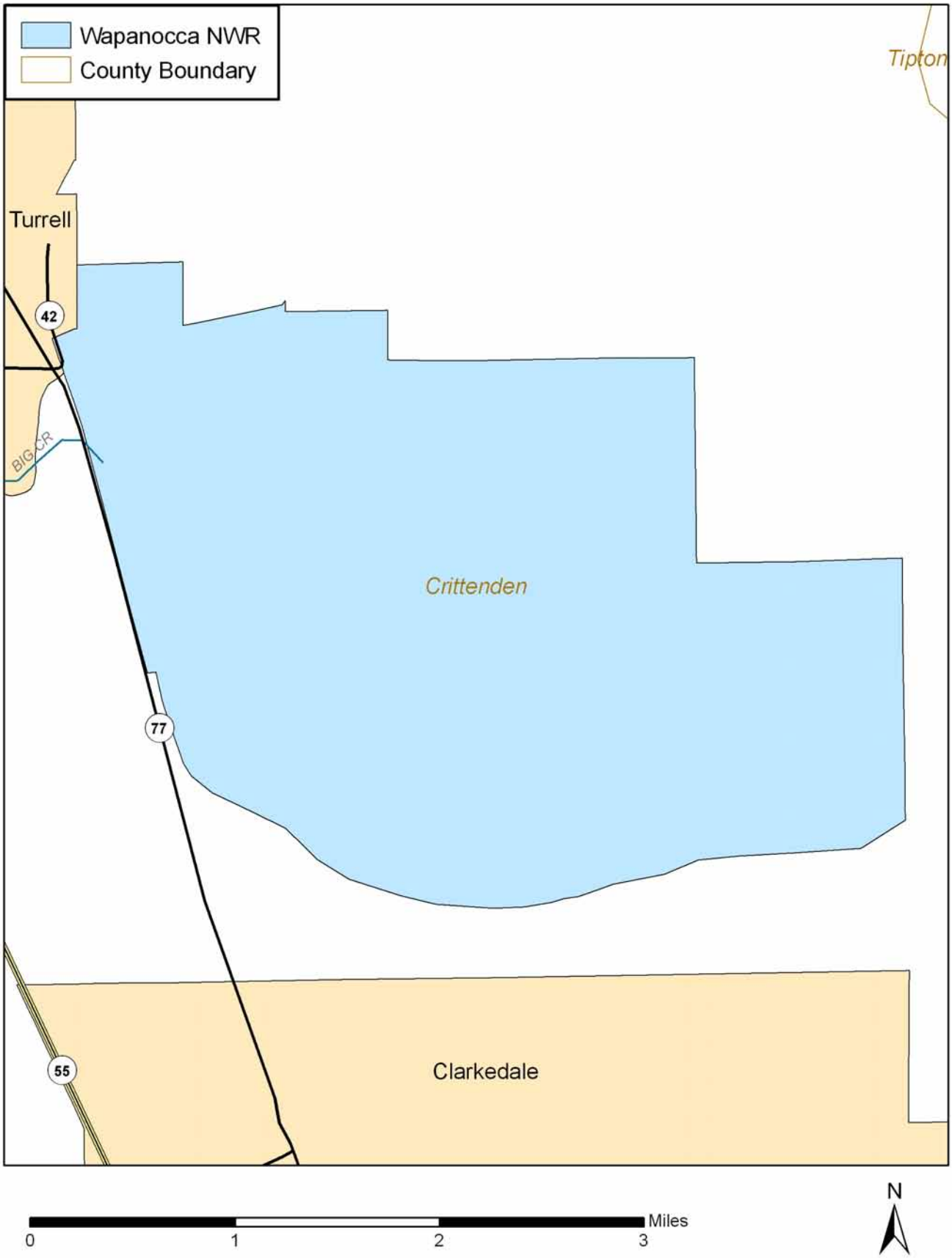
C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

signature 12-10-08 date

Field Supervisor AR ES FO
title


Wapanocca NWR
County Boundary
Tipton
Turrell
42
BIG CR
Crittenden
77
55
Clarkedale
0
1
2
3
Miles
N

Appendix G. Refuge Biota

Species – Common Name	Scientific Name
BIRDS – known to or likely to occur within Central Arkansas NWR Complex.	
Loons and Grebes	
Common Loon	*Gavia immer*
Pied-billed Grebe	*Podilymbus podiceps*
Horned Grebe	*Podiceps auritus*
Eared Grebe	*Podiceps nigricollis*
Pelicans and Allies	
American White Pelican	*Pelecanus erythrorhynchos*
Double-crested Cormorant	*Phalacrocorax auritus*
Anhinga	*Anhinga anhinga*
Herons, Egrets, Ibises, Spoonbills and Storks	
American Bittern	*Botaurus lentiginosus*
Least Bittern	*Ixobrychus exilis*
Great Blue Heron	*Ardea herodias*
Great Egret	*Casmerodius albus*
Snowy Egret	*Egretta thula*
Little Blue Heron	*Egretta caerulea*
Tricolored Heron	*Egretta tricolor*
Cattle Egret	*Bubulcus ibis*
Green Heron	*Butorides striatus*
Black-crowned Night-Heron	*Nycticorax nycticorax*
Yellow-crowned Night-Heron	*Nycticorax violaceus*
White-faced Ibis	*Plegadis chihi*
Glossy Ibis	*Plegadis falcinellus*
Roseate Spoonbill	*Ajaia ajaja*
Wood Stork	*Mycteria Americana*
New World Vultures	
Black Vulture	*Coragyps atratus*
Turkey Vulture	*Cathartes aura*
Ducks, Geese and Swans	
Black-bellied Whistling Duck	*Dendrocygna autumnalis*
Fulvous Whistling Duck	*Dendrocygna bicolor*
Greater White-fronted Goose	*Anser albifrons*
Snow Goose	*Chen caerulescens*
Ross' Goose	*Chen rossii*
Canada Goose	*Branta Canadensis*
Trumpeter Swan	*Cygnus buccinator*
Tundra Swan	*Cygnus columbianus*
Wood Duck	*Aix sponsa*
Gadwall	*Anas strepera*
American Wigeon	*Anas Americana*

American Black Duck	*Anas rubripes*
Mallard	*Anas platyrhynchos*
Mottled Duck	*Anas fulvigula*
Blue-winged Teal	*Anas discors*
Northern Shoveler	*Anas clypeata*
Northern Pintail	*Anas acuta*
Green-winged Teal	*Anas crecca*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Ring-necked Duck	*Aythya collaris*
Greater Scaup	*Aythya marila*
Lesser Scaup	*Aythya affinis*
Oldsquaw (or Long-tailed Duck)	*Clangula hyemalis*
Bufflehead	*Bucephala albeola*
Common Goldeneye	*Bucephala clangula*
Hooded Merganser	*Lophodytes cucullatus*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
Rudy Duck	*Oxyura jamaicensis*

Hawks and Falcons

Osprey	*Pandion haliaetus*
Swallow-tailed Kite	*Elanoides forficatus*
Mississippi Kite	*Ictinia mississippiensis*
Bald Eagle	*Haliaeetus leucocephalus*
Northern Harrier	*Circus cyaneus*
Sharp-shinned Hawk	*Accipiter striatus*
Cooper's Hawk	*Accipiter cooperii*
Northern Goshawk	*Accipiter gentilis*
Red-shouldered Hawk	*Buteo lineatus*
Broad-winged Hawk	*Buteo platypterus*
Swainson's Hawk	*Buteo swainsoni*
Red-tailed Hawk	*Buteo jamaicensis*
Rough-legged Hawk	*Buteo lagopus*
Golden Eagle	*Aquila chrysaetos*
American Kestrel	*Falco sparverius*
Merlin	*Falco columbarius*
Peregrine Falcon	*Falco peregrinus*

Turkey and Quail

Eastern Wild Turkey	*Meleagris gallopova*
Northern Bobwhite Quail	*Colinus virginianus*

Rails, Gallinules and Cranes

Yellow Rail	*Coturnicops noveboracensis*
Black Rail	*Laterallus jamaicensis*
King Rail	*Rallus elegans*
Virginia Rail	*Rallus limicola*
Sora	*Porzana Carolina*
Purple Gallinule	*Porphyrula martinica*
Common Moorhen	*Gallinula chloropus*

American Coot	*Fulica Americana*
Sandhill Crane	*Grus Canadensis*

Plovers, Sandpipers, Gulls, and Terns

Black-bellied Plover	*Pluvialis squatarola*
American (or Lesser) Golden-Plover	*Pluvialis dominica*
Semipalmated Plover	*Charadrius semipalmatus*
Piping Plover	*Charadrius melodus*
Killdeer	*Charadrius vociferous*
Black-necked Stilt	*Himantopus mexicanus*
American Avocet	*Recurvirostra Americana*
Greater Yellowlegs	*Tringa melanoleuca*
Lesser Yellowlegs	*Tringa flavipes*
Solitary Sandpiper	*Tringa solitaria*
Willet	*Catoptrohophorus semipalmatus*
Spotted Sandpiper	*Actitis macularia*
Upland Sandpiper	*Bartramia longicauda*
Sanderling	*Calidris alba*
Semipalmated Sandpiper	*Calidris pusilla*
Western Sandpiper	*Calidris mauri*
Least Sandpiper	*Calidris minutilla*
Pectoral Sandpiper	*Calidris melanotos*
White-rumped Sandpiper	*Calidris fuscicollis*
Baird's Sandpiper	*Calidris bairdii*
Dunlin	*Calidris alpine*
Stilt Sandpiper	*Calidris himantopus*
Short-billed Dowitcher	*Limnodromus griseus*
Long-billed Dowitcher	*Limnodromus scolopaceus*
Common Snipe	*Gallinago gallinago*
American Woodcock	*Scolopax minor*
Wilson's Phalarope	*Phalaropus tricolor*
Laughing Gull	*Larus atricilla*
Franklin's Gull	*Larus pipixcan*
Bonaparte's Gull	*Larus Philadelphia*
Ring-billed Gull	*Larus delawarensis*
Herring Gull	*Larus argentatus*
Glaucous Gull	*Larus hyperboreus*
Caspian Tern	*Sterna caspia*
Common Tern	*Sterna hirundo*
Forster's Tern	*Sterna forsteri*
Least Tern	*Sterna antillarum*
Black Tern	*Chlidonias niger*

Doves

Rock Pigeon	*Columbia livia*
Eurasian Collared-dove	*Streptopelia decaocto*
Morning Dove	*Zenaida macroura*
Common Ground-dove	*Columbina passerina*

Cuckoos and Roadrunners	
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*
Long-eared Owl	*Asio otus*
Short-eared Owl	*Asio flammeus*
Goatsuckers	
Common Nighthawk	*Chordeiles minor*
Chuck-will's-widow	*Caprimulgus carolinensis*
Whip-poor-will	*Caprimulgus vociferus*
Swifts and Hummingbirds	
Chimney Swift	*Chaetura 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*
Northern Flicker	*Colaptes auratus*
Pileated Woodpecker	*Dryocopus pileatus*
Ivory-billed Woodpecker	*Campephilus principalus*
Flycatchers	
Olive-sided Flycatcher	*Contopus borealis*
Eastern Wood-Pewee	*Contopus virens*
Yellow-bellied Flycatcher	*Empidonax flaviventris*
Acadian Flycatcher	*Empidonax virescens*
Alder Flycatcher	*Empidonax alnorum*
Willow Flycatcher	*Empidonax traillii*
Least Flycatcher	*Empidonax minimus*
Eastern Phoebe	*Sayornis phoebe*
Great Crested Flycatcher	*Myiarchus crinitus*
Eastern Kingbird	*Tyrannus tyrannus*
Scissor-tailed Flycatcher	*Tyrannus forficatus*
Shrikes	
Loggerhead Shrike	*Lanius ludovicianus*

Vireos	
White-eyed Vireo	*Vireo griseus*
Bell's Vireo	*Vireo bellii*
Solitary (or Blue-headed) Vireo	*Vireo solitarius*
Yellow-throated Vireo	*Vireo flavifrons*
Warbling Vireo	*Vireo galvus*
Philadelphia Vireo	*Vireo philadelphicus*
Red-eyed Vireo	*Vireo olivaceus*
Jays and Crows	
Blue Jay	*Cyanocitta cristata*
American Crow	*Corvus brachyrhynchos*
Fish Crow	*Corvus ossifragus*
Larks	
Horned Lark	*Eremophila alpestris*
Swallows	
Purple Martin	*Progne subis*
Tree Swallow	*Tachycineta bicolor*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Bank Swallow	*Riparia riparia*
Cliff Swallow	*Hirundo pyrrhonota*
Barn Swallow	*Hirundo rustica*
Chickadees and Titmice	
Carolina Chickadee	*Parus carolinensis*
Tufted Titmouse	*Parus bicolor*
Nuthatches	
Red-breasted Nuthatch	*Sitta Canadensis*
White-breasted Nuthatch	*Sitta carolinensis*
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*
Marsh Wren	*Cistothorus palustris*
Kinglets	
Golden-crowned Kinglet	*Regulus satrapa*
Ruby-crowned Kinglet	*Regulus calendula*
Gnatcatchers	
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, Thrashers and Allies	
Gray Catbird	*Dumetella carolinensis*
Northern Mockingbird	*Mimus polyglottos*
Brown Thrasher	*Toxostoma rufum*
Starlings	
European Starling	*Sturnus vulgaris*
Pipits	
American (or Water) Pipit	*Anthus spinoletta*
Sprague's Pipit	*Anthus spragueii*
Waxwing	
Cedar Waxwing	*Bombycilla cedrorum*
Wood Warblers	
Blue-winged Warbler	*Vermivora pinus*
Golden-winged Warbler	*Vermivora chrysoptera*
Tennessee Warbler	*Vermivora peregrina*
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*
Cape May Warbler	*Dendroica tigrina*
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	*Helmintheros vermivorus*

Swainson's Warbler	*Limnothlypis swainsonii*
Ovenbird	*Seiurus aurocapillus*
Northern Waterthrush	*Seiurus noveboracensis*
Louisiana Waterthrush	*Seiurus motacilla*
Kentucky Warbler	*Oporornis formosus*
Connecticut Warbler	*Oporornis agilis*
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*

New World Sparrows

Eastern (or Rufous-sided) Towhee	*Pipilo erythrophthalmus*
American Tree Sparrow	*Spizella arborea*
Chipping Sparrow	*Spizella passerine*
Clay-colored Sparrow	*Spizella pallida*
Field Sparrow	*Spizella pusilla*
Vesper Sparrow	*Pooecetes gramineus*
Lark Sparrow	*Chondestes grammacus*
Savannah Sparrow	*Passerculus sandwichensis*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Nelson's Sharp-tailed Sparrow	*Ammodramus caudacutus*
Fox Sparrow	*Passerella iliaca*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
Swamp Sparrow	*Melospiza Georgiana*
White-throated Sparrow	*Zonotrichia albicollis*
White-crowned Sparrow	*Zonotrichia leucophrys*
Dark-eyed Junco	*Junco hyemalis*
Lapland Longspur	*Calcarius lapponicus*
Smith's Longspur	*Calcarius pictus*

Cardinals, Grosbeaks and Allies

Northern Cardinal	*Cardinalis cardinalis*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Blue Grosbeak	*Guiraca caerulea*
Indigo Bunting	*Passerina cyanea*
Painted Bunting	*Passerina ciris*
Dickcissel	*Spiza americana*

Blackbirds and Allies

Bobolink	*Dolichonyx oryzivorus*
Red-winged Blackbird	*Agelaius phoeniceus*

Eastern Meadowlark	*Sturnella magna*
Western Meadowlark	*Sturnella neglecta*
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
Rusty Blackbird	*Euphagus carolinus*
Brewer's Blackbird	*Euphagus cyanocephalus*
Common Grackle	*Quiscalus quiscula*
Brown-headed Cowbird	*Molothrus ater*
Orchard Oriole	*Icterus spurius*
Baltimore (or Northern) Oriole	*Icterus galbula*

Finches

Purple Finch	*Carpodacus purpureus*
House Finch	*Carpodacus mexicanus*
Pine Siskin	*Carduelis pinus*
American Goldfinch	*Carduelis tristis*
Evening Grosbeak	*Coccothraustes vespertinus*

Old World Sparrows

House Sparrow	*Passer domesticus*

MAMMALS – known to or likely to occur within Central Arkansas NWR Complex.

Didelphidae

Virginia opossum	*Didelphus virginiana*

Soricidae

Southeastern shrew	*Sorex longirostris*
Southern short-tailed shrew	*Blarina carolinensis*
Least shrew	*Cryptotis parva*

Talpidae

Eastern mole	*Scalopus aquaticus*

Vespertilionidae

Little brown bat	*Myotis lucifugus*
Southeastern bat	*Myotis austroriparius*
Gray bat	*Myotis grisescens*
Indiana bat	*Myotis sodalis*
Silver-haired bat	*Lasioncyteris noctivagans*
Eastern pipistrelle	*Pipistrellus subflavus*
Big brown bat	*Eptesicus fuscus*
Red bat	*Lasiurus borealis*
Seminole bat	*Lasiurus seminolus*
Hoary bat	*Lasiurus cinereus*
Evening bat	*Nycticeius humeralis*
Rafinesque's big-eared bat	*Plecotus rafinesquii*

Dasypodidae

Nine-banded armadillo	*Dasypus novemcinctus*

Leporidae

Eastern cottontail	*Sylvilagus floridanus*
Swamp rabbit	*Sylvilagus aquaticus*

Sciuridae	
Eastern chipmunk	*Tamias striatus*
Woodchuck	*Marmota monax*
Gray squirrel	*Sciurus carolinensis*
Fox squirrel	*Sciurus niger*
Southern flying squirrel	*Glaucomys volans*
Geomyidae	
Baird's pocket gopher	*Geomys breviceps*
Castoridae	
Beaver	*Castor canadensis*
Muridae	
Marsh rice rat	*Oryzomys palustris*
Eastern harvest mouse	*Reithrodontomys humulis*
Fulvous harvest mouse	*Reithrodontomys fulvescens*
Deer mouse	*Peromyscus maniculatus*
White-footed mouse	*Peromyscus leucopus*
Cotton mouse	*Peromyscus gossypinus*
Golden mouse	*Ochrotomys nuttalli*
Hispid cotton rat	*Sigmodon hispidus*
Eastern woodrat	*Neotoma floridana*
Prairie vole	*Microtus ochrogaster*
Woodland vole	*Microtus pinetorum*
Muskrat	*Ondatra zibethicus*
Southern bog lemming	*Synaptomys cooperi*
Black rat	*Rattus rattus*
House mouse	*Mus musculus*
Norway rat	*Rattus norvegicus*
Capromyidae	
Nutria	*Myocastor coypus*
Canidae	
Coyote	*Canis latrans*
Red fox	*Vulpes vulpes*
Gray fox	*Urocyon cinereoargenteus*
Ursidae	
Black bear	*Ursus americanus*
Procyonidae	
Raccoon	*Procyon lotor*
Mustelidae	
Long-tailed weasel	*Mustela frenata*
Mink	*Mustela vison*
Eastern spotted skunk	*Spilogale putorius*
Striped skunk	*Mephitis mephitis*
River otter	*Lutra canadensis*

Felidae

Bobcat	*Felis rufus*

Suidae

Feral hog	*Sus scrofa*

Cervidae

White-tailed deer	*Odocoileus virginianus*

AMPHIBIANS & REPTILES – known to or likely to occur within Central Arkansas NWR Complex.

AMPHIBIANS

Ambystomatidae

Spotted salamander	*Ambystoma maculatum*
Marbled salamander	*Ambystoma opacum*
Mole salamander	*Ambystoma talpoideum*
Small-mouthed salamander	*Ambystoma texanum*

Amphiumidae

Three-toed amphiuma	*Amphiuma tridactylum*

Plethodontidae

Western slimy salamander	*Plethodon albagula*
Ozark zigzag salamander	*Plethodon angusticlavus*

Proteidae

Louisiana waterdog	*Necturus maculosus louisianensis*
Red River waterdog	*Necturus maculosus*

Salamandridae

Central newt	*Notophthalmus viridescens louisianens*

Sirenidae

Western lesser siren	*Siren intermedia nettingi*

Bufonidae

Dwarf American toad	*Bufo americanus charlesmithi*
Fowler's toad	*Bufo fowleri*

Hylidae

Blanchard's cricket frog	*Acris crepitans blanchardi*
Northern cricket frog	*Acris crepitans crepitans*
Bird-voiced treefrog	*Hyla avivoca*
Gray treefrog	*Hyla chrysoscelis* or *Hyla versicolor*
Green treefrog	*Hyla cinerea*
Northern spring peeper	*Pseudacris crucifer crucifer*
Upland chorus frog	*Pseudacris triseriata feriarum*

Microhylidae	
Eastern narrow-mouthed toad	*Gastrophryne carolinensis*
Pelobatidae	
Eastern spadefoot	*Scaphiopus holbrookii*
Ranidae	
Northern crawfish frog	*Rana areolata circulosa*
American bullfrog	*Rana catesbeiana*
Bronze frog	*Rana clamitans clamitans*
Pickerel frog	*Rana palustris*
Southern leopard frog	*Rana sphenocephala*
Gopher frog	*Rana capito*
REPTILES	
Alligatoridae	
American alligator	*Alligator mississippiensis*
Chelydridae	
Common snapping turtle	*Chelydra serpentina serpentina*
Alligator snapping turtle	*Macrochelys temmincki*
Emydidae	
Southern painted turtle	*Chrysemys picta dorsalis*
Western chicken turtle	*Deirochelys reticularia miaria*
Common map turtle	*Graptemys geographica*
Ouachita map turtle	*Graptemys ouachitensis ouachitensis*
Mississippi map turtle	*Graptemys pseudogeographica kohnii*
Eastern river cooter	*Pseudemys concinna*
Three-toed box turtle	*Terrapene carolina triunguis*
Ornate box turtle	*Terrapene ornata ornata*
Red-eared slider	*Trachemys scripta elegans*
Kinosternidae	
Mississippi mud turtle	*Kinosternon subrubrum hippocrepis*
Razor-backed musk turtle	*Sternotherus carinatus*
Stinkpot	*Sternotherus odoratus*
Trionychidae	
Midland smooth softshell	*Apalone mutica mutica*
Spiny softshell	*Apalone spiniferus*
Anguidae	
Western slender glass lizard	*Ophisaurus attenuatus attenuatus*

Phrynosomatidae	
Northern fence lizard	*Sceloporus undulates hyacinthinus*
Polychrotidae	
Northern green anole	*Anolis carolinensis carolinensis*
Scincidae	
Southern coal skink	*Eumeces anthracinus pluvialis*
Five-lined skink	*Eumeces fasciatus*
Broadhead skink	*Eumeces laticeps*
Ground skink	*Scincella lateralis*
Teiidae	
Prairie racerunner	*Cnemidophorus sexlineatus viridis*
Six-lined racerunner	*Cnemidophorus sexlineatus sexlineatu*
Colubridae	
Northern scarlet snake	*Cemophora coccinea copei*
Eastern racer	*Coluber constrictor*
Western rat snake	*Elaphe obsoleta*
Prairie kingsnake	*Lampropeltis calligaster calligaster*
Speckled kingsnake	*Lampropeltis getulus holbrooki*
Red milk snake	*Lampropeltis triangulum syspila*
Rough green snake	*Opheodrys aestivus*
Mississippi green water snake	*Nerodia cyclopion cyclopion*
Yellowbelly water snake	*Nerodia erythrogaster flavigaster*
Broad-banded water snake	*Nerodia fasciata confluens*
Diamondback water snake	*Nerodia rhombifer rhombifer*
Midland water snake	*Nerodia sipedon pleuralis*
Graham's crayfish snake	*Regina grahamii*
Midland brown snake	*Storeria dekayi wrightorum*
Northern redbelly snake	*Storeria occipitomaculata occipitomacu*
Western ribbon snake	*Thamnophis proximus proximus*
Eastern garter snake	*Thamnophis sirtalis sirtalis*
Rough earth snake	*Virginia striatula*
Western smooth snake	*Virginia valeriae elegans*
Western worm snake	*Carphophis vermis*
Midwest worm snake	*Carphophis amoenus*
Mississippi ringneck snake	*Diadophis punctatus stictogenys*
Western mud snake	*Farancia abacura reinwardti*
Eastern hognose snake	*Heterodon platyrhinos*
Flathead snake	*Tantilla gracilis*
Viperidae	
Southern copperhead	*Agkistrodon contortrix contortrix*
Western cottonmouth	*Agkistrodon piscivorus leucostoma*
Canebrake rattlesnake	*Crotalus horridus atricaudatus*
Western pygmy rattlesnake	*Sistrurus miliarius streckeri*

FISHES – known to or likely to occur within Central Arkansas NWR Complex.

Petromyzontidae	
Chestnut lamprey	*Ichthyomyzon castaneus*
American brook lamprey	*Lampetra appendix*
Acipenseridae	
Shovelnose sturgeon	*Scaphirhynchus platorynchus*
Polyodontidae	
Paddlefish	*Polyodon spathula*
Lepisosteidae	
Spotted gar	*Lepisosteus oculatus*
Longnose gar	*Lepisosteus osseus*
Shortnose gar	*Lepisosteus platostomus*
Alligator gar	*Atractosteus spatula*
Amiidae	
Bowfin	*Amia calva*
Anguillidae	
American eel	*Anguilla rostrata*
Clupeidae	
Skipjack herring	*Alosa chrysochloris*
Gizzard shad	*Dorosoma cepedianum*
Threadfin shad	*Dorosoma petenense*
Hiodontidae	
Goldeneye	*Hiodon alosoides*
Mooneye	*Hiodon tergisus*
Esocidae	
Grass pickerel	*Esox americanus*
Chain pickerel	*Esox niger*
Cyprinidae	
Common carp	*Cyprinus carpio*
Grass carp	*Ctenopharyngodon idella*
Silver carp	*Hypophthalmichthys molitrix*
Bighead carp	*Hypophthalmichthys nobilis*
Mississippi silvery minnow	*Hybognathus nuchalis*
Speckled chub	*Macrhybopsis aestivalis*
Silver chub	*Macrhybopsis storeriana*
Pallid shiner	*Hybopsis amnis*
Golden shiner	*Notemigonus crysoleucas*
Emerald shiner	*Notropis atherinoides*
Ghost shiner	*Notropis buchanani*
Taillight shiner	*Notropis maculates*
Weed shiner	*Notropis texanus*
Ironcolor shiner	*Notropis chalybaeus*

Mimic shiner	*Notropis volucellus*
Sabine shiner	*Notropis sabinae*
Pugnose minnow	*Opsopoeodus emiliae*
Ribbon shiner	*Lythrurus fumeus*
Redfin shiner	*Lythrurus umbratilis*
Blacktail shiner	*Cyprinella venusta*
Bullhead minnow	*Pimephales vigilax*
Bluntnose minnow	*Pimephales notatus*
Catostomidae	
Blue sucker	*Cycleptus elongatus*
River carpsucker	*Carpiodes carpio*
Quillback	*Carpiodes cyprinus*
Highfin carpsucker	*Carpiodes velifer*
Smallmouth buffalo	*Ictiobus bubalus*
Black buffalo	*Ictiobus niger*
Bigmouth buffalo	*Ictiobus cyprinellus*
Spotted sucker	*Minytrema melanops*
Shorthead redhorse	*Moxostoma macrolepidotum*
Golden redhorse	*Moxostoma erythrurum*
Lake chubsucker	*Erimyzon sucetta*
Ictaluridae	
Blue catfish	*Ictalurus furcatus*
Channel catfish	*Ictalurus punctatus*
Black bullhead	*Ameiurus melas*
Yellow bullhead	*Ameiurus natalis*
Tadpole madtom	*Noturus gyrinus*
Freckled madtom	*Noturus nocturnus*
Flathead catfish	*Pylodictis olivaris*
Aphredoderidae	
Pirate perch	*Aphredoderus sayanus*
Fundulidae	
Golden topminnow	*Fundulus chrysotus*
Blackstripe topminnow	*Fundulus notatus*
Blackspotted topminnow	*Fundulus olivaceus*
Starhead topminnow	*Fundulus dispar*
Poeciliidae	
Mosquitofish	*Gambusia affinis*
Atherinidae	
Brook silverside	*Labidesthes sicculus*
Inland silverside	*Menidia beryllina*

Moronidae	
White bass	*Morone chrysops*
Yellow bass	*Morone mississippiensis*
Striped bass	*Morone saxatilis*
Centrarchidae	
Flier	*Centrarchus macropterus*
Green sunfish	*Lepomis cyanellus*
Warmouth	*Lepomis gulosus*
Orangespotted sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Redear sunfish	*Lepomis microlophus*
Longear sunfish	*Lepomis megalotis*
Dollar sunfish	*Lepomis marginatus*
Spotted sunfish	*Lepomis punctatus*
Bantam sunfish	*Lepomis symmetricus*
Largemouth bass	*Micropterus salmoides*
Spotted bass	*Micropterus punctulatus*
White crappie	*Pomoxis annularis*
Black crappie	*Pomoxis nigromaculatus*
Elassomatidae	
Banded pygmy sunfish	*Elassoma zonatum*
Percidae	
Crystal darter	*Crystallaria asprella*
Scaly sand darter	*Ammocrypta vivax*
Western sand darter	*Ammocrypta clara*
Mud darter	*Etheostoma asprigene*
Bluntnose darter	*Etheostoma chlorosomum*
Slough darter	*Etheostoma gracile*
Cypress darter	*Etheostoma proeliare*
Swamp darter	*Etheostoma fusiforme*
Harlequin darter	*Etheostoma histrio*
Goldstripe darter	*Etheostoma parvipinne*
Speckled darter	*Etheostoma stigmaeum*
Logperch	*Percina caprodes*
Blackside darter	*Percina maculate*
Dusky darter	*Percina sciera*
River darter	*Percina shumardi*
Stargazing darter	*Percina uranidea*
Sauger	*Sander canadense*
Walleye	*Sander vitreus*
Sciaenidae	
Freshwater drum	*Aplodinotus grunniens*

MUSSEL SPECIES – known to occur or likely to occur within Central Arkansas NWR Complex

Unionidae

Bankclimber	*Plectomerus dombeyanus*
Fluted shell	*Lasmigona costata*
Mapleleaf	*Quadrula quadrula*
Monkeyface	*Quadrula metanevra*
Pimpleback	*Quadrula pustulosa*
Rabbitsfoot	*Quadrula cylindrica*
Southern mapleleaf	*Quadrula apiculata*
Wartyback	*Quadrula nodulata*
Pistolgrip	*Tritogonia verrucosa*
Purple wartyback	*Cyclonaias tuberculata*
Rock pocketbook	*Arcidens confragosus*
Threehorn wartyback	*Obliquaria reflexa*
Threeridge	*Amblema plicata*
Washboard	*Megalonaias nervosa*
Western fanshell	*Cyprogenia aberti*
Black sandshell	*Ligumia recta*
Scaleshell	*Leptodea leptodon*
Fragile papershell	*Leptodea fragilis*
Giant floater	*Pyganodon grandis*
Spike	*Elliptio dilatata*
Louisiana fatmucket	*Lampsilis hydiana*
Pink mucket	*Lampsilis abrupta*
Yellow sandshell	*Lampsilis teres*
Plain pocketbook	*Lampsilis cardium*
Butterfly	*Ellipsaria lineolata*
Deertoe	*Truncilla truncata*
Ebonyshell	*Fusconaia ebena*
Wabash pigtoe	*Fusconaia flava*
Fawnsfoot	*Truncilla donaciformis*
Flat floater	*Anodonta suborbiculata*
Hickorynut	*Obovaria olivaria*
Mucket	*Actinonaias ligamentina*
Fat pocketbook	*Potamilus capax*
Pink papershell	*Potamilus ohiensis*
Bleufer	*Potamilus purpuratus*
Pyramid pigtoe	*Pleurobema rubrum*
White heelsplitter	*Lasmigona complanata*
Creeper	*Strophitus undulatus*
Paper pondshell	*Utterbackia imbecillis*
Pondhorn	*Uniomerus tetralasmus*
Tapered pondhorn	*Uniomerus declivis*
Lilliput	*Toxolasma parvus*
Little spectaclecase	*Villosa lienosa*
Round pigtoe	*Pleurobema sintoxia*
Texas lilliput	*Toxolasma texasensis*
Asian clam	*Corbicula fluminea*
Zebra mussel	*Dreissena polymorpha*

VEGETATIVE SPECIES – known to or likely to occur within Central Arkansas NWR Complex; this is not a complete inventory.

Trees

Box Elder	*Acer negundo*
Red Maple	*Acer rubrum*
Silver Maple	*Acer saccharinum*
Mimosa	*Albizia julibrissin*
River Birch	*Betula nigra*
Bitter Pecan	*Carya aquatica*
Water Hickory	*Carya cordiformis*
Pignut Hickory	*Carya glabra*
Native Sweet Pecan	*Carya illinoenis*
Shellbark Hickory	*Carya laciniosa*
Shagbark Hickory	*Carya ovata*
Mockernut Hickory	*Carya tomentosa*
Southern Catalpa	*Catalpa bignonioides*
Sugarberry	*Celtis laevigata*
Hackberry	*Celtis occidentalis*
Redbud	*Cercis canadensis*
Persimmon	*Diospyros virginiana*
White Ash	*Fraxinus americana*
Green Ash	*Fraxinus pennsylavanica*
Pumpkin Ash	*Fraxinus tomentosa*
Water Locust	*Gleditsia aquatica*
Honey Locust	*Gleditsia triocanthos*
Kentucky Coffeetree	*Gymnocladus dioicus*
American Holly	*Ilex opaca*
Butternut	*Juglans cinerea*
Black Walnut	*Juglans nigra*
Eastern Redcedar	*Juniperus virginiana*
Sweetgum	*Liquidambar styraciflua*
Osage Orange	*Maclura pomifera*
Chinaberry	*Melia azedarach*
White Mulberry	*Morus alba*
Red Mulberry	*Morus rubra*
Water Tupelo	*Nyssa aquatica*
Swamp Tupelo	*Nyssa biflora*
Black Gum	*Nyssa sylvatica*
Paulownia	*Paulownia tomentosa*
Loblolly Pine	*Pinus taeda*
Sycamore	*Platinus occidentalis*
White Poplar	*Populus alba*
Cottonwood	*Populus deltoides*
Swamp Cottonwood	*Populus heterophylla*
Black Cherry	*Prunus serotina*
Sawtooth Oak	*Quercus acutissima*
White Oak	*Quercus alba*
Southern Red Oak	*Quercus falcata*
Cherrybark Oak	*Quercus falcata pagodifolia*

Overcup Oak	*Quercus lyrata*
Bur Oak	*Quercus macrocarpa*
Black Jack Oak	*Quercus marilandica*
Swamp Chestnut Oak	*Quercus michauxii*
Water Oak	*Quercus nigra*
Nuttall Oak	*Quercus nuttallii*
Diamond-leaf Oak	*Quercus obtusa*
Pin Oak	*Quercus palustris*
Willow Oak	*Quercus phellos*
Northern Red Oak	*Quercus rubra*
Shumard Oak	*Quercus shumardii*
Durand Oak	*Quercus sinuata*
Bottomland Post Oak	*Quercus stellata paludosa*
Upland Post Oak	*Quercus stellata stellata*
Black Oak	*Quercus velutina*
Black Locust	*Robinia pseudoacacia*
Black Willow	*Salix nigra*
Sassafras	*Sassafras albidum*
Baldcypress	*Taxodium distichum*
Winged Elm	*Ulmus alata*
American Elm	*Ulmus americana*
Cedar Elm	*Ulmus crassifolia*
Red Elm	*Ulmus rubra*

Shrubs

Red Buckeye	*Aesculus pavia*
Serviceberry	*Amelanchier arborea*
False Indigo	*Amorpha fruticosa*
Devil’s Walking Stick	*Aralia spinosa*
Giant Cane or Switchcane	*Arundinaria gigantica*
Paw Paw	*Asimina triloba*
Baccharis or Groundsel-tree	*Baccharis halimifolia*
Paper Mulberry	*Broussonetia papyrifera*
Gum Bumelia	*Bumelia lanuginosa*
American Beauty Berry	*Callicarpa americana*
Blue Beech or American Hornbeam	*Carpinus caroliniana*
Buttonbush	*Cephalanthus occidentalis*
Rough-leaf Dogwood	*Cornus drummondii*
Flowering Dogwood	*Cornus florida*
Swamp Dogwood	*Cornus foemina*
Mayhaw	*Crataegus aestivalis*
Parsley Hawthorne	*Crataegus marshallii*
Dotted Hawthorne	*Crataegus punctata*
Green Hawthorne	*Crataegus viridis*
American Euonymus	*Euonymus americanus*
Swamp Privet	*Foresteria accumunata*
St. John’s-wort	*Hypericum* spp.
Deciduous Holly or Possum Haw	*Ilex decidua*
Virginia Willow	*Itea virginica*
Florida Corkwood	*Leitneria floridana*
Lespedeza	*Lespedeza bicolor*

Common Privet	*Ligustrum volgare*
Spice Bush	*Lindera benzoin*
Pondberry	*Lindera melissifolia*
Iron Wood or Eastern Hophornbeam	*Ostrya virginiana*
Water Elm	*Planera aquatica*
Plum	*Prunus* spp.
Crab Apple	*Pyrus calleryana*
Carolina Buckthorn	*Rhamnus caroliniana*
Winged Sumac	*Rhus copallina*
Smooth Sumac	*Rhus glabra*
Multiflora Rose	*Rosa multiflora*
Swamp Rose	*Rosa palustris*
Blackberry	*Rubus* spp.
Dewberry	*Rubus flagellaris*
Trailing Blackberry	*Rubus trivialis*
Common Elderberry	*Sambucus canadensis*
Snow-bell	*Styrax americana*
Sparkleberry	*Vaccinium arboretum*
Rusty Blackhaw	*Viburnum rufidulum*
Arkansas Yucca	*Yucca arkansana*

Herbaceous Plants

Yarrow	*Achillea millefolium*
Ragweed	*Ambrosia* spp.
Green Dragon	*Arisaema dracontium*
Aster	*Asteraceae* spp.
Nettle	*Boehmeria cylindrica*
Sunflower Family	Compositae
Horseweed	*Conyza* spp.
Wild Carrot	*Daucus carota*
Fern	Polypodiaceae
Bedstraw	*Galium* spp.
Hibiscus	*Hibiscus* spp.
Penny-wort	*Hydrocotyle umbellate*
Spider Lily	*Hymenocallis* spp.
Jewel Weed	*Impatiens* spp.
Duckweed	*Lemna* spp.
Pepper Weed	*Lepidium* spp.
Creeping Lady's Sorrel	*Oxalis corniculata*
Arrow Arum	*Peltandra virginica*
Pokeweed	*Phytolacca americana*
Smartweed	*Polygonum* spp.
May Apple	*Podophyllum peltatum*
Buttercup	*Ranunculus* spp.
Curly Dock	*Rumex crispus*
Swamp Dock	*Rumex verticillatus*
Lizard Tail	*Saururus cernuus*
Horse Nettle	*Solanum carolinense*
Goldenrod	*Solidago* spp.
Goat's Beard	*Tragopogon dubius*
Venus' Looking Glass	*Triodanis perfoliata*

Cattail	*Typha* spp.
Smooth Vetch	*Vicia dasycarpa*
Violet	*Viola* spp.
Common Vetch	*Vicia sativa*
Prickley Pear	*Opuntia spp.*
Grasses	*Various spp.*
Mosses	*Various spp.*
Rushes	*Various spp.*
Sedges	*Various spp.*

Vines

Hog Peanut	*Amphicarpaea bracteata*
Peppervine	*Ampleopsis arborea*
Supple-jack	*Berchemia scandens*
Crossvine	*Bignonia capreolata*
Redvine	*Brunnichia cirrohosa*
Cupseed	*Calycocarpum lyonii*
Trumpet Creeper	*Campsis radicans*
Carolina Moonseed	*Cocculus caroliniana*
Morning Glory	Convolvulaceae
Japanese Honeysuckle	*Lonicera japonica*
Trumpet Honeysuckle	*Lonicera sempervirens*
Climbing Hempweed	*Mikania scandens*
Virginia Creeper	*Parthenocissus quinquefolia*
Passion Flower	*Passiflora incarnate*
Kudzu	*Pueraria lobata*
Greenbrier	*Smilax* spp.
Poison-ivy	*Toxicodendron radicans*
Climbing Dogbane	*Trachelospermum difforme*
Muscadine	*Vitis rotundifolia*
Grape	*Vitis* spp.
Wisteria	*Wisteria sinensis*

Appendix H. Birds of Conservation Concern for BCR 26 Occurring on Central Arkansas NWR Complex.

American Bittern (nb)	BK	BL	CR	W
Least Bittern	BK	BL	CR*	W
Swallow-tailed Kite			CR*	W
Bald Eagle (b)	BK	BL	CR	W
Peregrine Falcon (b)	BK	BL	CR*	W
Yellow Rail (nb)	BK		CR*	
Black Rail			CR*	
Solitary Sandpiper (nb)	BK	BL	CR	W
Hudsonian Godwit (nb)	BK			
Marbled Godwit (nb)	BK			
Buff-breasted Sandpiper (nb)	BK			
Short-billed Dowitcher (nb)	BK		CR*	W
Short-eared Owl (nb)	BK		CR*	W
Red-headed Woodpecker	BK	BL	CR	W
Sedge Wren (nb)	BK		CR	W
Wood Thrush	BK	BL	CR	W
Cerulean Warbler	BK	BL	CR	W
Prothonotary Warbler	BK	BL	CR	W
Swainson's Warbler	BK	BL	CR	W
Kentucky Warbler	BK	BL	CR	W
Henslow's Sparrow (nb)	BK	BL		W
LeConte's Sparrow (nb)	BK	BL	CR	W
Painted Bunting	BK		CR*	W
Dickcissel	BK	BL	CR	W
Rusty Blackbird (nb)	BK	BL	CR	W
Orchard Oriole	BK		CR	W

*NOTE: * = Non-verified occurrences on Refuge, but has potential.*

BK = Bald Knob NWR

BL = Big Lake NWR

CR = Cache River NWR

W = Wapanocca NWR

Appendix I. Budget Requests

REFUGE OPERATING NEEDS SYSTEM (RONS)

FY08-3367	Provide Biological Technician	$ 77,321	Bald Knob
FY08-3373	Provide Laborer Position	$ 56,610	Bald Knob
FY08-3378	Provide Equipment Operator Position	$ 77,650	Bald Knob
FY08-3385	Provide Supervisory Wildlife Specialist	$114,439	Bald Knob
	Provide Park Ranger (Visitor Services)	$ 94,588	Bald Knob
FY08-3156	Provide Law Enforcement Officer	$ 97,292	Big Lake
FY08-3179	Provide Biological Technician	$ 77,321	Big Lake
FY08-3197	Provide Hydrologist	$114,439	Big Lake
FY08-3293	Provide Laborer	$ 55,800	Big Lake
FY08-3316	Restore Ecosystem Health & Natural Hydrology	$240,000	Big Lake
FY08-3329	Improve Educational & Interpretative Material to Connect People to Nature	$150,000	Big Lake
FY08-3341	Reduce Invading American Lotus to less than 30% of Open Water Areas	$ 65,000	Big Lake
FY08-3353	Enhance Seasonal Water Level Management	$250,000	Big Lake
FY08-1938	Provide Park Ranger (Visitor Services)	$114,439	Cache River
FY08-1963	Provide Refuge Ecologist	$114,439	Cache River
FY08-2595	Provide Biological Technician	$ 77,321	Cache River
FY08-3085	Provide Forestry Technician	$ 77,321	Cache River
FY08-3089	Provide Equipment Operator	$ 77,650	Cache River
	Provide Laborer	$ 55,800	Cache River
FY08-3091	Provide Assistant Forester	$114,439	Cache River
FY08-3101	Provide Realty Specialist	$137,165	Cache River
FY08-3210	Provide Facilities Operations Specialist	$114,439	Cache River
FY08-3238	Provide Office Assistant	$ 69,584	Cache River
FY08-3395	Provide Park Ranger (Law Enforcement)	$ 97,292	Cache River
FY08-3875	Provide Supervisory Wildlife Specialist	$114,439	Cache River
FY08-4220	Cache River NWR Stream Restoration	$170,640	Cache River
FY08-4234	Howell Tract Impoundment Restoration	$ 42,956	Cache River
FY08-4241	Plunkett Farm Waterfowl Sanctuary Enhancement	$ 50,800	Cache River
FY08-3117	Provide Park Ranger (Visitor Services)	$ 94,588	Wapanocca
FY08-3140	Provide Biological Technician	$ 77,321	Wapanocca
FY08-3167	Provide Equipment Operator	$ 77,650	Wapanocca
FY08-3191	Provide Laborer	$ 56,610	Wapanocca
FY08-4128	Grassland Restoration	$105,062	Wapanocca
FY08-4421	Bottomland Hardwood Forest Restoration	$137,482	Wapanocca

SERVICE ASSET MAINTENANCE MANAGEMENT SYSTEM (SAMMS)

WORK ORDER	ASSET NUMBER	DESCRIPTION	COST ESTIMATE	TYPE	STATION
2007732649	10017508	Replace dilapidated 14' X 60' Office Trailer	$ 350K	Deferred Maintenance	Bald Knob
2007732682	10040538	Rehabilitate damaged and leaking Granary East Canal.	$ 85K	Deferred Maintenance	Bald Knob
2007716161	10041690	Repair overgrown Little Red River flood protection levee	$ 320K	Deferred Maintenance	Bald Knob
04134134	10017546	Rehabilitate the 1.41 mile X 26 foot Bottom 300 Acre Field	$ 100K	Deferred Maintenance	Bald Knob
2005218680	10017522	Rehabilitate Mingo Creek Access Road	$ 200K	Deferred Maintenance	Bald Knob
2007716105	10040633	Replace failed 300 Acre Field culvert crossings	$ 60K	Deferred Maintenance	Bald Knob
2007716141	10040783	Replace severely damaged main entrance gate	$ 20K	Deferred Maintenance	Bald Knob
2007716106	10040744	Replace failed Middle 1,000 Acre Field Entrance crossings	$ 45K	Deferred Maintenance	Bald Knob
2005204594	10040280	Rehabilitate Low Road	$ 60K	Deferred Maintenance	Bald Knob
03124955	481749	Replace 1997 John Deere 690E Excavator	$ 130K	Heavy Equipment	Bald Knob
00101762	481296	Replace 1968 Caterpillar D7 Dozer	$ 190K	Heavy Equipment	Bald Knob
01113415	482386	Replace 1980 Terex Loader	$ 90K	Heavy Equipment	Bald Knob
05137595	482238	Replace 1999 John Deere 410 Backhoe	$ 80K	Heavy Equipment	Bald Knob
2008845829	654407	Replace 1960 Low Boy Equipment Trailer	$ 50K	Small Equipment	Bald Knob
	485634	Replace 2005 Ford 4x4 Refuge Manager Truck	$ 26K	Small Equipment	Bald Knob
	485949	Replace 2006 Ford 4x4 Equipment Operator Truck	$ 26K	Small Equipment	Bald Knob
	486967	Replace 2008 Ford 4x4 LE Truck	$ 26K	Small Equipment	Bald Knob
05137576	483680	Replace 2002 International Truck Tractor	$95K	Small Equipment	Bald Knob
2007733603	10017469	Rehabilitate worn and damaged refuge office / visitor contact station.	$ 350K	Deferred Maintenance	Big Lake
2007683065	10017469	Reroof HQ Building	$ 35K	Deferred Maintenance	Big Lake

WORK ORDER	ASSET NUMBER	DESCRIPTION	COST ESTIMATE	TYPE	STATION
2007716164	10039656	Repair damaged retaining wall	$ 100K	Deferred Maintenance	Big Lake
2007733607	10017491	Repair Ditch 28 Bridge	$ 300K	Deferred Maintenance	Big Lake
2005207265	10017485	Rehabilitate Timm's Point public Parking Area	$ 75K	Deferred Maintenance	Big Lake
2006531982	10017482	Repair FHWA Rte 904 - Big Lake Fishing Area	$ 50K	Deferred Maintenance	Big Lake
2006557432	10017484	Repair Ditch 81 Levee Road Parking Area	$ 15K	Deferred Maintenance	Big Lake
2007716115	10017493	Repair Bright's Landing fishing pier	$ 20K	Deferred Maintenance	Big Lake
2005222810	10039661	Rehabilitate Wildlife Auto Drive	$ 900K	Deferred Maintenance	Big Lake
2006531558	10017479	Repair FHWA Rte 903 – Bright's Landing Parking Area	$ 75K	Deferred Maintenance	Big Lake
2006531978	10017481	Repair FHWA Rte 010 – HQ Visitors Parking Area	$ 100K	Deferred Maintenance	Big Lake
2006531989	10039658	Repair FHWA Rte 901 – Oak Island Parking Area	$ 25K	Deferred Maintenance	Big Lake
2006531992	10039659	Repair FHWA Rte 905 – Handicapped Parking Area	$ 25K	Deferred Maintenance	Big Lake
2007716155	10017483	Repair overgrown Ditch 81 levee	$ 200K	Deferred Maintenance	Big Lake
04134105	482385	Replace 1999 John Deere 6410 Tractor	$ 90K	Heavy Equipment	Big Lake
04134102	480489	Replace 1995 John Deere 6400 Tractor	$ 90K	Heavy Equipment	Big Lake
	484166	Replace 2008 Ford 4 x 4 Truck	$ 26K	Small Equipment	Big Lake
	486968	Replace 2008 Ford 4 x 4 Truck	$ 26K	Small Equipment	Big Lake
	482424	Replace 2000 Dodge Durango	$ 26K	Small Equipment	Big Lake
	486121	Replace CX15 Mower	$ 15K	Small Equipment	Big Lake
05138039	484654	Replace HX15 Mower	$ 15K	Small Equipment	Big Lake
	10037753	Repair damaged Plunkett Farm unit water control structure.	$ 25K	Deferred Maintenance	Cache River
	10017399	Renovate Cache River Headquarters interior.	$ 80K	Deferred Maintenance	Cache River
03125419	10041694	Rehabilitate Gin Lane South Road.	$ 160K	Deferred Maintenance	Cache River

WORK ORDER	ASSET NUMBER	DESCRIPTION	COST ESTIMATE	TYPE	STATION
	10042100	Replace worn refuge boundary signs	$ 25K	Deferred Maintenance	Cache River
	10017399	Replace roof and exterior siding on Cache River HQ Building	$ 105K	Deferred Maintenance	Cache River
2005253254	10017454	Rehabilitate Cache Bayou Road.	$ 180K	Deferred Maintenance	Cache River
	10017411	Rehabilitate Dixie Unit South Road water control structures	$ 27K	Deferred Maintenance	Cache River
	10017425	Rehabilitate Dixie Unit North Road water control structures	$ 40K	Deferred Maintenance	Cache River
2005204642	10017440	Rehabilitate Horseshoe Lake Road	$ 120K	Deferred Maintenance	Cache River
2005202117	10045116	Rehabilitate Robinson Tract East Road.	$ 50K	Deferred Maintenance	Cache River
2005202761	10051113	Rehabilitate Robinson Tract West Road.	$ 50K	Deferred Maintenance	Cache River
01113994	473434	Replace 1992 John Deere 410 Backhoe	$ 80K	Heavy Equipment	Cache River
01113463	473513	Replace 1991 John Deere 4555 Tractor	$ 95K	Heavy Equipment	Cache River
05137578	481950	Replace 1998 John Deere 6400 Tractor	$ 70K	Heavy Equipment	Cache River
03124938	481951	Replace 1998 John Deere 6400 Tractor	$ 70K	Heavy Equipment	Cache River
05137634	482179	Replace 1999 Ford 6640 Tractor	$ 30K	Heavy Equipment	Cache River
2008883006	485698	Replace 2005 Caterpillar 320 Excavator	$ 130K	Heavy Equipment	Cache River
	10105926	Replace 1018 Mowers (2)	$ 20K	Small Equipment	Cache River
		Replace 1999 1754 War Eagle Boat	$ 8K	Small Equipment	Cache River
	481612	Replace 1995 Ford Ranger 4x4 Intern Truck	$25K	Small Equipment	Cache River
03124943	482200	Replace 1999 Sterling Truck Tractor	$ 95K	Small Equipment	Cache River
	485174	Replace 2004 Ford 4x4 Biologist Truck	$ 26K	Small Equipment	Cache River
	485581	Replace 2005 Ford 4x4 Forester Truck	$ 26K	Small Equipment	Cache River
	483994	Replace 2002 Ford 4x4 Service Truck	$ 29K	Small Equipment	Cache River
05138041	484647	Replace 2003 Ford 4x4 SCEP Truck	$25K	Small Equipment	Cache River

WORK ORDER	ASSET NUMBER	DESCRIPTION	COST ESTIMATE	TYPE	STATION
	485691	Replace 2006 Ford 4x4 LE Truck	$ 27K	Small Equipment	Cache River
	485733	Replace 2005 Dodge Caravan Van	$ 26K	Small Equipment	Cache River
	486173	Replace 2007 Ford 4x4 Equipment Operator Truck	$ 26K	Small Equipment	Cache River
	486778	Replace 2007 Ford 4x4 Deputy Project Leader Truck	$ 26K	Small Equipment	Cache River
	486866	Replace 2007 Ford 4x4 Project Leader Truck	$ 26K	Small Equipment	Cache River
	486917	Replace 2008 Ford 4x4 Equipment Operator Truck	$ 26K	Small Equipment	Cache River
97110055	10017399	Plan design and construct a Refuge Administrative Headquarters and Environmental Education Center	$ 6M	Construction	Cache River
		Construct cross levees and enhance water management operations on the Plunkett Farm waterfowl sanctuary	$ 65 K	Construction	Cache River
01123192		Construct a wildlife observation tower, entrance road and interpretive trail at the Howell Tract unit.	$ 150K	Construction	Cache River
		Construct irrigation system for 700 acre Howell Tract moist-soil unit	$ 150K	Construction	Cache River
		Construct an interpretive wildlife trail at the George Tract unit.	$ 50K	Construction	Cache River
		Construct a bunkhouse at the Refuge Headquarters	$ 432K	Construction	Cache River
00110763		Construct a wildlife observation tower and interpretive trail at the Plunkett Farm waterfowl sanctuary.	$ 90K	Construction	Cache River
		Construct a wildlife observation tower on the Dixie Farm waterfowl sanctuary.	$ 90K	Construction	Cache River
2006558819	10019349	Dredge Ditch 8	$ 875K	Deferred Maintenance	Wapanocca
2006557060	10041766	Clean out and remove trees from Ditch 2	$ 300K	Deferred Maintenance	Wapanocca
2007716250	10040585	Repair overgrown Levee 5 water control structures	$ 125K	Deferred Maintenance	Wapanocca
2007741429	10019312	Replace aged shingled roof on Wapanocca NWR HQ/VC	$ 100K	Deferred Maintenance	Wapanocca
2007741447	10019313	Rehabilitate maintenance shop building	$ 75K	Deferred Maintenance	Wapanocca

WORK ORDER	ASSET NUMBER	DESCRIPTION	COST ESTIMATE	TYPE	STATION
2007701839	10019335	Repair worn FHWA Route 011 - Nature Drive Road.	$ 60K	Deferred Maintenance	Wapanocca
2007733000	10019289	Replace worn and inadequate Big Creek bridge.	$ 200K	Deferred Maintenance	Wapanocca
2007733003	10019304	Replace worn and unsafe Driver's bridge	$ 200K	Deferred Maintenance	Wapanocca
2005219850	10036754	Rehabilitate public use parking lots	$ 30K	Deferred Maintenance	Wapanocca
2007733009	10019324	Rehabilitate overgrown public use boat launch and boardwalk.	$ 125K	Deferred Maintenance	Wapanocca
2007733030	10041456	Rehabilitate silted County Ditch 4 drainage ditch.	$ 150K	Deferred Maintenance	Wapanocca
2007733004	10019313	Repair worn vehicle storage building.	$ 50K	Deferred Maintenance	Wapanocca
01111796	481850	Replace 1996 John Deere 6400 Tractor	$ 90K	Heavy Equipment	Wapanocca
		Replace 1962 Field Disk	$ 25K	Heavy Equipment	Wapanocca
98102485	451836	Replace 1980 Caterpillar 120G Grader	$ 120K	Heavy Equipment	Wapanocca
04133882	483959	Replace 2002 Ford Ranger 4x4 Pickup	$ 25K	Small Equipment	Wapanocca
2007702424	482403	Replace 2002 Chevy 3/4 ton 4x4 Pickup	$ 25K	Small Equipment	Wapanocca

Appendix J. List of Preparers

PLANNING TEAM

Judy McClendon, Natural Resource Planner (Retired), U.S. Fish and Wildlife Service, Augusta, Arkansas –Planning Team Leader, Co-writer and Editor, assisted with overall CCP process and plan development, coordinated biological and visitor services reviews, and public meetings.

William Smith, Assistant Natural Resource Planner, U.S. Fish and Wildlife Service, Central Arkansas National Wildlife Refuge Complex, Augusta, Arkansas – Editor, provided biota lists and assisted with preparation of various plan sections, and Appropriateness and Compatibility Determinations.

Leon Kolankiewicz, Environmental Consultant, Mangi Environmental Group, McLean, Virginia – Assisted with overall development of CCP and preparation of EA.

Keith Weaver, Project Leader, U.S. Fish and Wildlife Service, Central Arkansas National Wildlife Refuge Complex, Augusta, Arkansas – Co-writer and Editor, provided overall guidance and oversight for CCP process and plan development.

Jonathan Windley, Deputy Project Leader, U.S. Fish and Wildlife Service, Central Arkansas National Wildlife Refuge Complex, Augusta, Arkansas – Assisted with overall development, guidance, and oversight.

Robert Alexander, Refuge Manager, U.S. Fish and Wildlife Service, Bald Knob National Wildlife Refuge, Bald Knob, Arkansas – Assisted with development, guidance, and oversight for Bald Knob NWR.

Jeremy Bennett, Refuge Manager, U.S. Fish and Wildlife Service, Big Lake National Wildlife Refuge, Manila, Arkansas – Assisted with development, guidance, and oversight for Big Lake NWR.

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Pre-planning for this CCP began in 2006 and 2007, when Biological and Public Use Reviews of Central Arkansas National Wildlife Refuges were held. Experts and specialists listed below and on the previous page submitted recommendations for future management. These recommendations were used extensively during the development of this plan. Contributors included:

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