
**DRAFT COMPREHENSIVE CONSERVATION PLAN FOR
HATCHIE NATIONAL WILDLIFE REFUGE**
Haywood County, Tennessee

U.S. Department of the Interior
Fish and Wildlife Service
Southeast Region
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SECTION A. DRAFT COMPREHENSIVE CONSERVATION PLAN

I. Introduction/Background

This Draft Comprehensive Conservation Plan (CCP) has been prepared for the Hatchie National Wildlife Refuge. The CCP is a management tool to be used by the refuge staff. It will help guide management decisions over the next 15 years, and sets forth strategies for achieving refuge goals and objectives within that timeframe. When fully implemented, this CCP will strive to achieve the refuge vision, goals, objectives, and strategies, which have been developed by a planning team of federal, state, local, non-governmental, and private individuals. Overriding considerations reflected in the CCP are that fish and wildlife conservation requires first priority in refuge management and that wildlife-dependent recreation is allowed and encouraged as long as it is compatible with, or does not detract from, the mission of the National Wildlife Refuge System or the purpose for which the refuge was established. This chapter discusses the following topics: a brief description of Hatchie Refuge and how it came into existence; the purpose of and need for the plan; the purpose and vision of the refuge; the National Wildlife Refuge System mission, goals, and guiding principles, including the legal context, which guides management; and other relevant plans and partnerships that affect refuge management.

REFUGE OVERVIEW: History of Refuge Establishment, Acquisition, and Management

The Fish and Wildlife Act of 1956, as amended [16 USC 742f (a) (4) (5)], is the specific law granting authority for acquiring lands for national wildlife refuges. Under this Act, the Secretary of the Interior is authorized to take 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. The Act also authorizes the Fish and Wildlife Service to accept gifts of real or personal property for its benefit and use in performing its activities and services.

Hatchie Refuge was established on November 16, 1964, at a meeting of the Migratory Bird Commission, under the authority of the Migratory Bird Conservation Act. The first staff was assigned in November 1965 and about 6,700 acres were under the administration of the "Bureau of Sport Fisheries and Wildlife." The refuge now totals 11,556 acres, and all land acquisition within the original boundary is complete.

It is anticipated that funding for future land acquisitions, if a boundary expansion is approved, would be provided through the Migratory Bird Conservation Fund. The authorities for the use of these funds for land acquisition are the Migratory Bird Conservation Act (16 U.S.C. Sec. 715d) and the Refuge Recreation Act (16 U.S.C. Sec. 460k-1).

PURPOSE OF AND NEED FOR THE COMPREHENSIVE CONSERVATION PLAN

The purpose of the CCP is to identify the role the refuge will play in support of the National Wildlife Refuge System and to provide guidance in refuge management activities for the next 15 years. Under the provisions of the National Wildlife Refuge System Improvement Act of 1997, the Fish and Wildlife Service is required to develop comprehensive conservation plans for all lands and waters of the National Wildlife Refuge System. The National Environmental Policy Act (NEPA) also ensures that the Service assesses the environmental impacts of any actions taken as a result of implementing the CCP.

The plan is also needed to:

- Provide a clear statement of the desired future conditions for habitat, wildlife, facilities, and people;
- Provide refuge neighbors, visitors, and government officials with a clear understanding of the reasons for management actions on and around the refuge;
- Ensure that management of the refuge reflects the policies and goals of the National Wildlife Refuge System;
- Ensure the compatibility of current and future uses of the refuge;
- Provide long-term continuity in refuge management; and
- Provide a basis for refuge operations, maintenance, and capital improvement requests.

FISH AND WILDLIFE SERVICE

The Fish and Wildlife Service is the primary federal agency responsible for conserving, protecting, and enhancing the nation's fish and wildlife populations and their habitats. The Service also has specific trustee responsibilities for migratory birds, threatened and endangered species, anadromous fish, and certain marine mammals, as well as for lands and waters administered by the Service for the management and protection of these resources. For further information regarding migratory birds, see the website <http://birds.fws.gov/>. The Service also shares conservation responsibilities with other federal, state, tribal, local, and private entities.

The mission of the 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.”

As part of its mission, the Service manages nearly 550 national wildlife refuges covering over 96 million acres. These areas comprise the National Wildlife Refuge System, the world's largest collection of lands with a “Wildlife First” emphasis, with 77 million acres in Alaska and the remaining 19 million acres spread across the other 49 states and several island territories.

NATIONAL WILDLIFE REFUGE SYSTEM

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

“... to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57)

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

- Fulfill the mission of the National Wildlife Refuge System;
- Fulfill the individual purpose of each refuge;

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

Approximately 40 million people visited national wildlife refuges in 2004, most to observe wildlife in their natural habitats. As visitation grows, there are significant economic benefits to local communities. Nearly 40 percent of the country's adults spent \$101 billion on wildlife-related pursuits in 1996, according to the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (USDI 1996). Volunteers also continue to be a major contributor to the success of the Refuge System. In 2004, volunteers contributed more than 1.3 million hours on refuges nationwide, a service valued at more than \$23 million.

In more recent studies (October 2003), economists published "Banking on Nature," an updated version of an original 1997 report on the economic benefit of national wildlife refuges. The report found that in 2002, more than 35.5 million visits to national wildlife refuges fueled more than \$809 million in sales of recreation equipment, food, lodging, transportation, and other expenditures. That figure is more than double the \$401.1 million generated in 1995, the last time the study was conducted. (http://refuges.fws.gov/policyMakers/pdfs/BankingOnNature_091703c.pdf)

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

LEGAL AND POLICY GUIDANCE

Directives from Service and National Wildlife Refuge System policy, Congressional legislation, Presidential executive orders, and international treaties guide administration of national wildlife refuges. Policies for management options of the refuge are further refined by administrative guidelines established by the Secretary of the Interior. Management options of the refuge's establishing authorities, Public Law 104, (Stat. 2957, Section 108, H.R. 3338), and the National Wildlife Refuge System Improvement Act of 1997, the legal and policy guidance for the operation of national wildlife refuges, are contained in documents and acts listed in Appendix III.

Guidance and direction can also be found in the following:

- National Wildlife Refuge System Administration Act of 1966 authorizes the Secretary of the Interior to permit uses of a refuge "whenever he determines that such uses are compatible with the major purposes for which such areas were established;"
- Refuge Recreation Act of 1962, which requires that any recreational use of refuge lands can be an appropriate incidental or secondary use if it is practicable and not inconsistent with the primary objectives for which a refuge was established, and that these uses not interfere with other previously authorized operations;
- Title 50 of the Code of Federal Regulations;
- Fish and Wildlife Service Manual; and

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- National Wildlife Refuge System Improvement Act of 1997, which is the “organic” law for the National Wildlife Refuge System. The Act amends the National Wildlife Refuge System Administration Act of 1966.

The National Wildlife Refuge System Improvement Act was passed in 1997. This legislation established a unifying mission for the Refuge System, a new process for determining compatible public use activities on refuges, and the requirements to prepare comprehensive conservation plans for each refuge. The Refuge Improvement Act states that, first and foremost, the refuge system must focus on wildlife conservation. It further states that the national mission, coupled with the purpose(s) for which each refuge was established, will provide the principal management direction.

Regarding public use, the Refuge Improvement Act declared that all existing or proposed public uses must be “compatible” with each refuge’s purpose. Six wildlife-dependent public uses were highlighted in the legislation as priorities to evaluate in comprehensive conservation plans. The six uses are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Lands within the National Wildlife Refuge System are closed to public uses until specifically and legally opened. All programs and uses must be evaluated based on mandates set forth in the Refuge Improvement Act. Those mandates are to:

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

EXISTING PARTNERSHIPS

In an effort to better accomplish the mission of the National Wildlife Refuge System, the Service continues to work cooperatively and develop relationships with numerous agencies, nongovernmental organizations, educational institutions, and businesses. In keeping with this partnering concept, this draft comprehensive conservation plan supports other significant regional, national, and international resource management plans, including the North American Waterfowl Management Plan, the Lower Mississippi River Joint Venture Project, the Lower Mississippi Valley Migratory Bird Wetlands Conservation Initiative, the National Wetlands Priority Conservation Plan, the Partners-in-Flight Initiative, the Western Hemisphere Shorebird Reserve Network, the Lower Mississippi River Ecosystem Plan, the Hatchie River Plan, and the West Tennessee Wildlife Resources Conservation Plan.

A provision of the Refuge 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 together provide the foundation for protection of species and biological diversity, and contribute to the overall health and conservation of fish and wildlife species in Tennessee.

The Tennessee Wildlife Resources Agency (TWRA) (<http://www.state.tn.us/twra>) is the state agency charged with management responsibilities relating to fish and wildlife resources within the

state. TWRA manages approximately 1.35 million acres of state wildlife management areas, coordinates the state's wildlife conservation program, and provides public recreation opportunities, including an extensive hunting and fishing program on state wildlife management areas.

An important part of the comprehensive conservation planning process is integrating common mission objectives where appropriate. The State's participation and contribution throughout this comprehensive conservation planning process provide for ongoing opportunities and open dialogue to improve the management of fish and wildlife resources in Tennessee.

In conjunction with comprehensive conservation planning in west Tennessee, a collaborative planning process was performed simultaneously with the State of Tennessee beginning in 1999. This joint planning study area included all of west Tennessee, from the Mississippi River to the Tennessee River, and from border-to-border between the states of Kentucky and Mississippi, encompassing approximately 10,000 square miles of private, state, and federal lands, including national wildlife refuge lands (Figure 1). It was determined that this cooperative planning effort would develop comprehensive plans for state, private, and federal lands.

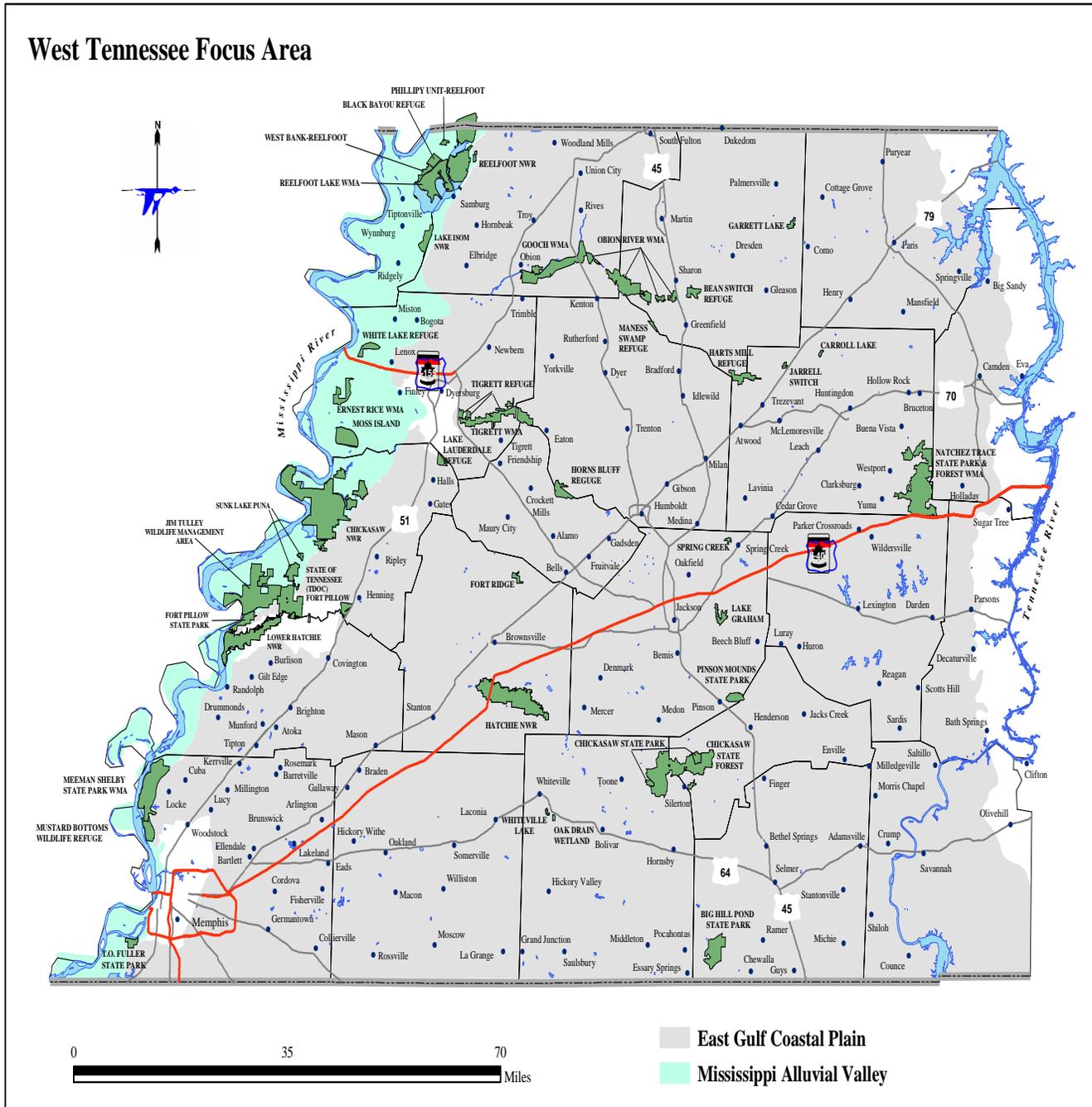
In order to perform planning jointly, certain distinctions had to be made between the cooperating agencies. Whereas the Service is required in all "significant" management actions to satisfy the mandates of the NEPA (including opportunities for public comment and participation, and required documentation), state agencies are not required to satisfy NEPA. In essence, certain regulations that dictate federal planning requirements do not apply to TWRA. Plans were made to combine planning to the extent possible, while still providing the necessary autonomy within the process for each agency to accomplish its desired objectives.

A planning process outline was developed (Figure 2), which allowed both agencies to accomplish their planning objectives in a cooperative fashion. The process would produce joint objectives for west Tennessee lands and allow the Service to plan according to NEPA requirements, while providing TWRA the freedom to accomplish its planning objectives without being encumbered by NEPA provisions.

A Core Group was formed to oversee the planning process in 1999. This group consisted of TWRA and Service project leaders, planners, and biologists who served to guide the overall effort. Under the leadership of the Core Group, nine Resource Working Groups were developed to study specific resource categories, including waterfowl, shorebirds, songbirds, big game, farm game, mammals, reptiles, amphibians, other aquatic resources, and public use. Each group was composed of individuals from various agencies, organizations, and universities, as well as private sector individuals with expertise in particular resources. The groups gathered information on species and critical habitats and developed management strategies for west Tennessee resource groups. These groups developed focus area-wide goals and objectives that were then translated into a series of map overlays, which ranked areas of specific interest and provided a simple means of interrelating the various types of resource information included in each map. In addition, each working group developed a text describing goals, objectives, and strategies for implementing the desired goals and objectives for each specific resource category.

The map overlays and accompanying texts were interpreted into goals, objectives, and strategies for private, state, and federal lands and were incorporated into the Draft West Tennessee Wildlife Resources Conservation Plan (2004). The Service then used these goals, objectives, and strategies for federal lands as the biological foundation for the comprehensive conservation planning process. Based on these biological foundations for west Tennessee lands, this planning process resulted in the production of this draft comprehensive conservation plan for Hatchie Refuge, as well as plans for Reelfoot, Lake Isom, Chickasaw, and Lower Hatchie Refuges.

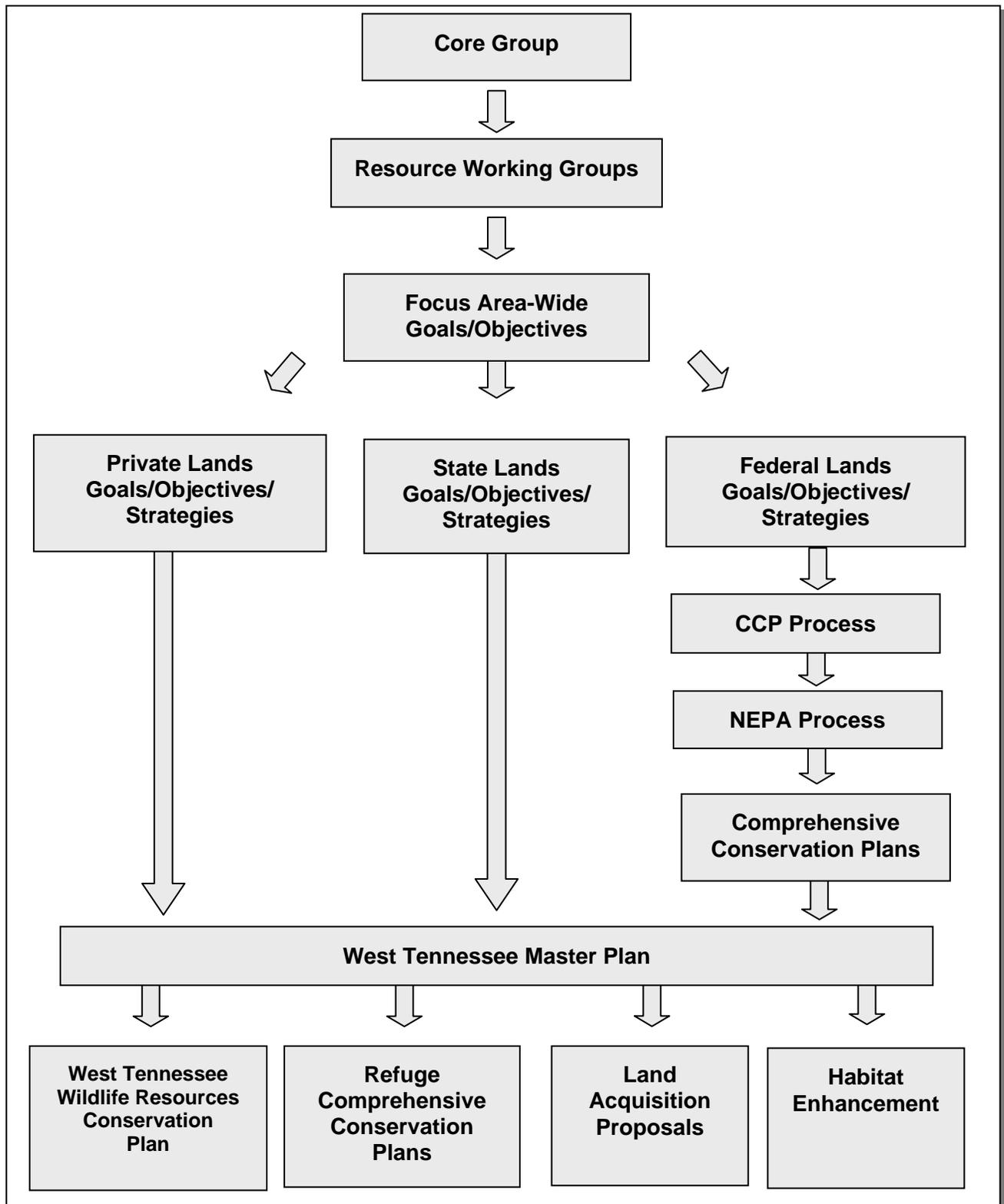
Figure 1. Focus area for west Tennessee planning effort



This cooperative planning effort with the State of Tennessee and other partners was recognized by a national “Customer Service Excellence Award” in 2003 from the Department of the Interior.

Once finalized, the comprehensive conservation plan will be combined with the map overlays and text of the West Tennessee Wildlife Resources Conservation Plan to form the master document for the entire west Tennessee planning effort, called the West Tennessee Master Plan. This final product is

Figure 2. West Tennessee planning process



expected to be compiled in 2005 and will serve as a valuable resource for state and federal managers alike, especially from a standpoint of cooperative, interagency management, and administration of west Tennessee resources.

Hatchie PRIDE (Protection, Restoration, Information, Development, and Education in an Ecosystem approach) was established in 1991 as a group of governmental and non-governmental agencies and organizations formed to deal with the amount of sediment entering the Hatchie River. Hatchie PRIDE cooperators included: Tennessee Conservation League, Haywood County Soil Conservation District, Hardeman County Soil Conservation District, Fayette County Conservation District, University of Tennessee Extension Service, Tennessee Department of Agriculture, Tennessee Farm Bureau, Tennessee Division of Forestry, Tennessee Department of Environment and Conservation, U.S. Geological Survey, U.S. Army Corps of Engineers, USDA Soil Conservation Service (now Natural Resources Conservation Service), U.S. Weather Service, Chickasaw-Shiloh Resource Conservation and Development Council, N.A.S.A., and U.S. Fish and Wildlife Service. In 1999, this group became the Hatchie River Alliance and The Nature Conservancy's Hatchie River Project has taken the lead in this effort.

The Haywood County Bass Club has sponsored numerous fishing events at Oneal Lake over the past 13 years for youth, senior citizens, and anglers with disabilities.

Tennessee Partners Project is an assistance program for landowner management of waterfowl habitat. In addition to local landowners, the partners include Ducks Unlimited, Tennessee Wildlife Resources Agency, Natural Resources Conservation Service, University of Tennessee Agricultural Extension Office, Tennessee Department of Agriculture, and the Fish and Wildlife Service. The Tennessee Partners Project is implemented in support of the North American Waterfowl Management Plan.

Tennessee Department of Environmental Conservation maintains an air quality monitoring station on the refuge.

The project leader for Hatchie Refuge is a member of the Lower Mississippi River Ecosystem Team. This team consists of Fish and Wildlife Service employees from across various program areas, such as refuges, ecological services, fisheries, migratory birds, and law enforcement.

ECOSYSTEM CONTEXT

OVERVIEW

On a national level, the Service has adopted an ecosystem approach to resource management and has identified 52 ecosystems in the United States (USFWS 1994). Hatchie Refuge is located within the Lower Mississippi River Ecosystem (Figure 3). Service resource priorities for the Lower Mississippi River Ecosystem are:

- Conserve, enhance, protect, and monitor migratory bird populations and their habitats in the Lower Mississippi River Ecosystem.
- Protect, restore, and manage the wetlands of the Lower Mississippi River Ecosystem.
- Protect and/or restore imperiled habitats and viable populations of all threatened, endangered, and candidate species and species of concern in the Lower Mississippi River Ecosystem.
- Protect, restore, and manage the fisheries and other aquatic resources historically associated with the wetlands and waters of the Lower Mississippi River Ecosystem.
- Restore, manage, and protect National Wildlife Refuges and National Fish Hatcheries (USFWS Ecosystem Plan 2000).

The Lower Mississippi Valley (the Lower Mississippi Valley is a subset geographically of the Lower Mississippi River Ecosystem) once supported a vast bottomland hardwood forest complex that extended along the Mississippi River from Illinois to Louisiana. Today, less than 20 percent of this bottomland hardwood forest remains and most is fragmented or remains in scattered patches throughout the region (Figure 4). Floodwaters once recharged wildlife habitats and created rich, dynamic systems that supported a diverse abundance of fish and wildlife species. Today, the Lower Mississippi Valley is bisected by levees and its hydrology is restricted by flood control projects and agricultural diversion. Water quality is significantly impacted by agricultural and industrial runoff. Rivers and water bodies throughout are highly turbid, laden with pesticides, and support a small fraction of the once abundant aquatic resources.

Recovery and protection of habitats and wildlife species require the joint efforts of private landowners, local communities, and state and federal agencies. The Service continues to focus efforts on adopting collaborative resource partnerships in order to reduce the declining trends of fish and wildlife populations and biological diversity, establish conservation priorities, clarify goals, and solve common threats and problems associated with fish and wildlife resources. Biological objectives targeted in this plan reflect the common interests of numerous state and federal agencies, local governments, non-governmental organizations, and private interests, and are supportive of numerous regionally, nationally, and internationally significant plans, as listed previously.

THREATS AND PROBLEMS

The Lower Mississippi Valley is among the most heavily modified areas in the southeastern United States and has the dubious distinction of being one of the most deforested of all southeastern physiographic areas (Twedt et al., 1999). Clearing and fragmentation of forests have resulted in irreplaceable losses of wildlife habitats, species, and biological diversity. National wildlife refuges in the Lower Mississippi Valley serve as a critical safety net for preservation and management of the remaining wildlife resources.

Threats and problems affecting biological diversity in the Lower Mississippi Valley include:

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

As a result of these large-scale impacts, many species endemic to the Lower Mississippi Valley have become extinct, threatened, or endangered. The red wolf and Florida panther are no longer found in the Lower Mississippi Valley; the ivory-billed woodpecker and Bachman's warbler, once known to occur in the area, are considered critically endangered, if not extinct.

Habitat loss and fragmentation and hydrologic alteration in the Mississippi Alluvial Valley have resulted in population declines in both overwintering waterfowl and migratory forest birds (Bonney et al., 2000). Populations of dabbling ducks have decreased in the past several decades, and evidence indicates

the availability of foraging habitat (or lack thereof) has had the greatest influence on the abundance, distribution, and body condition of waterfowl in the Mississippi Alluvial Valley (Loesch et al., 1994).

Species most adversely affected by deforestation and fragmentation are species that are area sensitive or dependent on special habitat requirements, such as large, mature blocks of forest that offer secure nesting habitat and a particular food source. At least 107 bird species nest regularly in the Mississippi Alluvial Valley, excluding wading birds and colonial nesting waterbirds, with at least 70 species occurring in bottomland hardwoods as a primary habitat (Twedt et al., 1999). Less than 1 percent of the remaining forest patches is large enough to support source populations of area-sensitive species, such as cerulean warblers, Swainson's warblers, and swallow-tailed kites (Bonney et al., 2000).

Modifications to the historic floodplains have caused major declines in fishery and aquatic resource productivity. Despite the efforts by the Service and others to conserve fish and other aquatic resources, a growing number is declining at alarming rates. On a national level, almost 400 aquatic species either have, or need, special protection in some part of their natural or historic range (Williams et al., 1989; Moyle and Leidy 1992). The number of aquatic species listed as threatened or endangered under the Endangered Species Act in 2002 has increased to 19 amphibian species, 21 crustacean species, 70 mussel species, and 115 fish species. The reasons for these declines are linked largely to habitat loss or alteration (including flow changes, watershed modifications, sedimentation, and pollution) and the impacts of harmful exotic or transplanted species (USFWS 2002).

CONSERVATION PRIORITIES AND INITIATIVES

Conservation priorities for national wildlife refuges in the Lower Mississippi Valley focus on threatened and endangered species, trust species, and species of area concern. By working with others, the Service is more effective in achieving its overall mission and management goals. Bottomland hardwood forests are also considered a high priority of the Fish and Wildlife Service and other agencies on which to focus conservation and management efforts. A combination of land protection and habitat management methods is utilized by the Service and others to compensate for bottomland hardwood habitat loss and to meet shared/common long-term goals established for this area.

The goals of the North American Waterfowl Management Plan and the Joint Venture Plan have also been considered in the development of this plan. The Lower Mississippi Valley serves as the primary wintering habitat for mid-continent waterfowl populations. The goal of the North American Waterfowl Management Plan (North American Waterfowl Management Plan Committee 1998) is to develop partnerships between private and governmental organizations to address the maintenance and management of continental waterfowl populations, and to reverse the persistent loss of North American wetland habitats. In addition, the Lower Mississippi Valley Joint Venture plan encompasses a regional approach with the same objectives to reduce or eliminate habitat losses for wetland-dependent migratory birds. The Joint Venture initiated cooperative efforts among public and private conservation groups to restore lands that provide maximum benefits to migratory waterfowl and songbirds and has identified conservation areas on which to focus future land protection and restoration efforts.

One of the Joint Venture's long-term goals is to provide "forest islands" for migratory bird conservation in the Lower Mississippi Valley, ranging in size from 10,000 to more than 100,000 acres. Hatchie Refuge also resides within the East Gulf Coastal Plain. Habitat objectives for this plain have been established by Partners-in-Flight in the East Gulf Coastal Plain Habitat Conservation Plan (Ford et al., 2001). In order to meet population objectives for migratory landbirds, the plan has identified two 20,000-acre tracts on the Hatchie River in west Tennessee. These targeted land bases will serve as priority areas for forest restoration and will some day serve as important "anchors" for biological diversity.

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

The Lower Mississippi River Ecosystem Plan (USFWS 2000) has established five resource ecosystem goals, which have also been considered in the development of this plan. These goals involve the protection, enhancement, and management of the following: migratory bird populations and habitats; wetlands; habitats; populations of threatened, endangered, and candidate species; fisheries and aquatic resources; and national wildlife refuges and national fish hatcheries.

Conservation management on private lands is extremely important to the future conservation of fish and wildlife resources. To achieve conservation priorities on private lands and in conjunction with public lands, the synergy of federal, state, tribal, and private organizations working together will ensure that the Service not only protects the more important areas, but also helps to reduce redundancy and overlap in the management efforts of various agencies and private organizations.

II. The Planning Process

DESCRIPTION OF THE PLANNING PROCESS

The key to effective conservation begins with effective community involvement. To ensure that future management of the refuge is reflective of the issues, concerns, and opportunities expressed by the public, a variety of public involvement techniques was used.

The planning effort includes the preparation of four comprehensive conservation plans, comprising five national wildlife refuges (Hatchie, Reelfoot, Lake Isom, Chickasaw, and Lower Hatchie), as well as the cooperative, interagency West Tennessee Wildlife Resources Conservation Plan. The West Tennessee plan identifies resources and management goals for approximately 10,000 square miles of federal, state, and private lands in west Tennessee, with an emphasis on migratory birds. In addition to serving as a guide for resource management efforts in the western third of the state, the West Tennessee Plan provides the main biological foundation for the four west Tennessee refuge comprehensive conservation plans (Reelfoot and Lake Isom refuge plans are combined into one document).

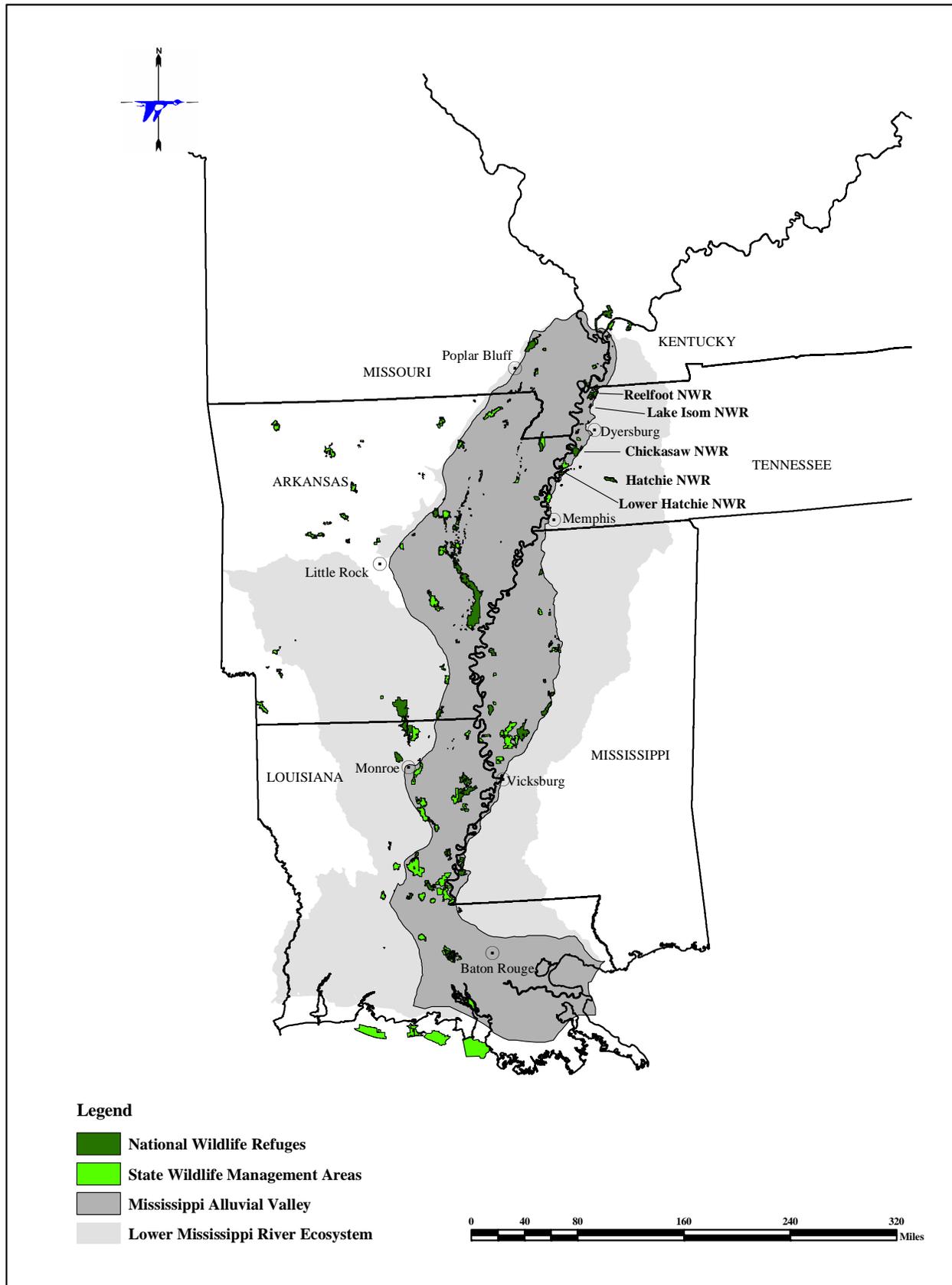
In the Mississippi Alluvial Valley (Figure 3), migratory bird habitat requirements were developed prior to the comprehensive conservation planning process (Ford and Wathen 2001; USFWS 2000; and Twedt et al., 1999). Given these prior Alluvial Valley recommendations, it was clear that ample habitat to meet these habitat objectives could not be provided on refuges alone. Therefore, in order to achieve the habitat goals that had already been set, the west Tennessee planning effort looked beyond the respective refuge boundaries and incorporated into the planning effort any public and private lands that might be available. This cooperative planning effort between the Service and the Tennessee Wildlife Resources Agency produced a broad overview of present and future resource management needs for west Tennessee and incorporated over 6 million acres.

The final product will be a West Tennessee Master Plan, which will incorporate the basic recommendations of the West Tennessee Wildlife Resources Conservation Plan within the context of the four refuge plans. The primary objective of the master plan is to provide a means of cooperatively protecting, restoring, and managing a sufficient amount and diversity of habitats to meet the requirements of migratory birds and resident wildlife that use federal, state, and private land habitats in the western third of the State of Tennessee.

The planning process began in January 2000 with initial Core Group meetings in which the Service and the Tennessee Wildlife Resources Agency began efforts to produce the West Tennessee Wildlife Resources Conservation Plan. The Core Group selected nine resource working groups, which then began the process of developing goals, objectives, and strategies for specific resource categories on federal, state, and private lands within the planning area (Figure 1).

Preplanning for this plan also began during early 2000. Issue identification is a major factor in determining management goals and objectives for comprehensive conservation plans. To ensure that future refuge management is responsive to all relevant issues and concerns, a series of meetings and interviews was conducted to guide issue selection for the planning effort. In September 2000, the Hatchie Refuge technical team (which included staff of Hatchie Refuge) began meeting to discuss refuge issues and management opportunities, and on November 6, 2000, a public scoping

Figure 3. Lower Mississippi River Ecosystem



meeting was held in Brownsville, Tennessee. The scoping meeting was advertised locally and by mailings. At the meeting, the public was given the opportunity to express written and oral comments regarding perceived issues and opportunities for management of the refuge. The planning staff then developed a comprehensive list of issues to be considered in the development of management alternatives in the environmental assessment.

Coordination with federal, state, and local agencies, as well as non-governmental organizations and surrounding communities, is also essential to ensure support for the plan and projects identified for the refuge. In April 2001, an initial meeting was held with the Hatchie Planning Review Group, in which refuge neighbors, organizations, educators, government agencies, and local officials were invited to attend and share their thoughts in a focus group meeting. The Hatchie Planning Review Group includes representatives from Tennessee Wildlife Resources Agency, The Nature Conservancy, Tennessee Department of Environment and Conservation, Anderson-Tully Company, Friends of West Tennessee National Wildlife Refuges, Ducks Unlimited, Tennessee State Parks, U.S. Geological Survey, and local sportsmen, farmers, landowners, businesses, and county officials. This group provided oversight during the planning process with input from professional counterparts and local individuals and private interests.

The nine resource working groups began meeting in early 2000. In January 2002, the Draft West Tennessee Wildlife Resources Conservation Plan was completed and became available as the primary biological foundation for much of the Hatchie Refuge planning process. Based on this biological foundation, other relevant documents, input received from the public, and the staff's professional judgment, the Hatchie Technical Team evaluated relevant issues and resource needs and developed various management alternatives that were then considered in the environmental assessment. The range of alternatives developed in the environmental assessment addresses four different management scenarios in which all relevant issues and concerns are considered in the context of at least one of the alternatives. The environmental assessment constitutes the documentation and the process by which the proposed action was selected.

Several reviews of the refuge's management programs occurred during 2002 including: waterfowl management and farming, neotropical migratory birds and forest management, public uses and visitor services, and an overall biological review. The Biological Review team developed goals, objectives, and strategies for accomplishing the preferred management scenario.

A second public meeting will be held to allow review and comment on this draft plan, and a third public meeting will be held to present the final plan.

PLANNING ISSUES

Issue identification provides the basis for initiating the development of management objectives and strategies. These issues play a role in determining future conditions of the refuge and will be considered in the long-term management plan. The issues and concerns described in the following pages were generated by the public, planning review group, and Service staff. An initial list of issues was consolidated into the following 21 issue categories concerning Hatchie Refuge, and were grouped according to five broad management categories: fish and wildlife population issues, habitat issues, visitor services and environmental education issues, refuge administration and operation issues, and land protection and conservation issues. See Appendix IX for a summary of the actual comments received during the public scoping process.

Waterfowl Populations

Since the refuge's establishing purpose was specifically as an "inviolable sanctuary for migratory birds," all operation and management scenarios are considered in light of their impact on migratory birds, the most numerous of which are waterfowl. The refuge staff monitors waterfowl populations that utilize the refuge and will work to provide sufficient, high quality habitat to fulfill population objectives set for the Mississippi Alluvial Valley, as established in Ford (2001) and the West Tennessee Wildlife Resources Conservation Plan (TWRA and USFWS 2002). A portion of the refuge is dedicated to providing seasonally flooded cropland, moist-soil impoundments, and forested wetlands to meet the feeding, resting, and breeding needs of migratory and resident waterfowl. In order for the refuge to meet its objectives for waterfowl, it must maintain enough cropland/moist-soil areas to meet waterfowl habitat needs and provide sufficient sanctuary areas for undisturbed resting and feeding.

Songbird Populations

Nearly every study examining North American neotropical migratory bird population trends has reported declines in at least some species (Askins et al., 1990). The Mississippi Alluvial Valley has been identified as a physiographic area experiencing some of the most widespread and pronounced declines (Hamel et al., 1994). Partners-in-Flight conservation plans have been developed for the Mississippi Alluvial Valley (Twedt et al., 1998) and the East Gulf Coastal Plain (Woodrey et al., 1998) to address priority species and bird conservation issues. The refuge will continue to work to monitor migratory and resident songbirds and to address habitat issues that affect resident and neotropical migratory bird populations, in keeping with refuge goals and establishing purposes.

Threatened and Endangered Species

As a national wildlife refuge, a key function of Hatchie Refuge is to enhance the survival of threatened and endangered species. Federally listed threatened or endangered animals are thought to use or populate lands within or in close proximity to the refuge, including the bald eagle. Several bald eagles are historically known to winter annually on the refuge, although no active nests are documented on refuge lands. The refuge's habitat restoration and protection activities continue to provide suitable habitat for nesting eagles.

Resident Species Populations

Resident species include game species, such as white-tailed deer, wild turkey, squirrels, rabbits, and furbearers, as well as non-game groups, including mammals, reptiles, and amphibians. The refuge monitors some resident wildlife populations through surveys, such as deer and turkey harvest data collection, and cursory surveys by universities of small mammals, amphibians, and reptiles. Species groups that lend themselves to management (e.g., deer and turkey) are managed at levels consistent with habitat availability, refuge management goals, and refuge purposes. Other species are observed and monitored in order to identify potential management issues. Benefits to resident species are considered when opportunities exist for refuge expansion.

Shorebird Populations

Because of the abundance of agricultural land with water control capabilities, along with frequent inundation of fields by floodwaters, the Mississippi Alluvial Valley has significant potential for providing shorebird habitat (Elliott and McKnight 2000). Refuge waterfowl management activities provide

concurrent opportunities to provide shorebird habitat, especially in conjunction with management of impoundments and moist-soil units. The staff monitors refuge shorebird use and looks for opportunities to support priorities outlined in the West Tennessee Wildlife Resource Conservation Plan for migratory and resident shorebird populations, in keeping with refuge goals and establishing purposes.

HABITAT ISSUES

Waterfowl Habitat

Providing habitat for migratory birds, the most numerous of which are waterfowl, was the purpose for which the refuge was established. Thus, management priorities must be directed toward providing quality wetland areas that are attractive to migratory birds, including dabbling ducks, diving ducks, and geese. Each management unit provides a unique set of resources that are necessary for each group to complete its respective life cycle. A portion of the refuge is dedicated to providing seasonally flooded cropland, moist-soil impoundments, and forested wetlands to meet the feeding, resting, and breeding needs of migratory and resident waterfowl. In order for the refuge to meet its objectives for waterfowl, it must maintain enough cropland/moist-soil areas to meet waterfowl habitat needs and provide sufficient sanctuary areas for undisturbed resting and feeding.

Songbird Habitat

As stated in the previous section concerning waterfowl habitat, priorities on the refuge include providing quality habitat for migratory birds, including neotropical migratory songbirds. Land management practices, especially forest management practices, will continue to take into account the value of such practices to songbird habitat. The refuge will continue to work to monitor migratory and resident songbirds and to address habitat issues that affect resident and neotropical migratory bird populations, in keeping with refuge goals and establishing purposes.

Forest Habitat

The refuge protects more than 9,764 acres of bottomland hardwood habitat and 382 acres of upland forest. The forests found on the refuge provide invaluable habitat for the wide range of wildlife species that inhabit the refuge and are critical to the preservation of this drastically diminishing habitat type. Bottomland hardwood forests are critical to migratory and wintering waterfowl, particularly mallards and wood ducks. The forested tracts on the refuge provide crucial food resources, such as hard and soft mast, and invertebrates for mallards during flood events that occur during the fall and early spring periods. The refuge will complete a Habitat Management Plan, including forest habitat,, and management decisions will be made for vegetation management and control based on resource goals, refuge purposes, and with due consideration for all other environmental factors.

Cropland Habitat

Agricultural crops play an important role in migratory bird management, as they provide a source of high-energy carbohydrates needed during periods of cold weather. Typically, the refuge supplies corn and soybean crops that are either rotated with moist-soil units or produced on the higher elevations to ensure that wildlife have a readily available food source. Hatchie Refuge's cropland operation occupies approximately 929 acres (295 acres impounded and 634 acres unimpounded). Many crop fields that are planted for the refuge can be flooded for waterfowl utilization. Under the cooperative farming agreement, the refuge usually receives its portion on the lower and wetter fields. This, coupled with any approval for refuge expansion and subsequent acquisitions, sets the stage for the refuge to make substantial contributions to the Mississippi Flyway migratory bird objectives. The

refuge farming program will continue to work to address habitat issues that affect migratory bird populations, in keeping with refuge goals and establishing purposes.

Moist-Soil Habitat

Moist-soil habitats are an integral part of managing public wetlands for waterfowl as these food resources are provided in large part only on state and federal lands. The Hatchie River and the associated river floodplain are capable of supplying food resources, such as barnyard grass, sprangletop, smartweeds, rice cut-grass, and a host of other beneficial herbaceous plant species. The acreage of these early successional habitats varies annually depending on how quickly the fields dry out after dewatering, and plays a key role in the migration patterns of mid-continent waterfowl and other migratory birds. Refuge resource management, including moist-soil habitat, will in large part, influence the refuge's present and future benefits to waterfowl. Management of the moist-soil units will continue to address habitat issues that affect migratory bird populations, in keeping with refuge goals and establishing purposes.

VISITOR SERVICES AND ENVIRONMENTAL EDUCATION ISSUES

Hunting and Fishing Access and Opportunities

The National Wildlife Refuge System Improvement Act of 1997 identified hunting and fishing as two consumptive priority public uses for national wildlife refuges. Hunting and fishing are integral parts of west Tennessee culture. Due to this, and a limited amount of public lands, there is considerable interest in expanding refuge hunting and fishing opportunities. Any additional hunting opportunities will be dependent on providing safe, quality experiences that are compatible with refuge purposes. The refuge will revisit its Hunting and Fishing plans and examine opportunities to increase and/or enhance hunting and fishing opportunities on the refuge, in keeping with other resource needs, establishing purpose, and funding and staffing capabilities.

Nonconsumptive Recreational Opportunities

The National Wildlife Refuge System Improvement Act of 1997 identified wildlife observation, wildlife photography, and environmental education and interpretation as nonconsumptive priority public uses for national wildlife refuges. In keeping with this legislation, these four uses will be provided when deemed compatible, and opportunities will be examined for increasing these uses. Currently, the majority of refuge public use consists of hunting, fishing, and wildlife observation. The refuge currently does not have staff or facilities to provide significant on-refuge environmental education and interpretation, or wildlife-dependent recreational programming. More exposure resulting from expanded nonconsumptive recreational uses and programs would increase public awareness and have a positive effect on other refuge programs. The refuge is located in Haywood County (population approximately 19,437)(U.S. Census Bureau 2000), about 50 miles northeast of Memphis, Tennessee (population approximately 603,507) and approximately 30 miles west of Jackson, Tennessee (population approximately 51,115). Better-developed visitor facilities would provide wildlife-dependent environmental education and interpretation, and recreational opportunities currently not available in Haywood County. The refuge will revisit its Public Use and Visitor Services Plan and examine opportunities to increase and enhance nonconsumptive recreational opportunities on the refuge, in keeping with other resource needs, the purpose for which the refuge was established, and also within funding and staffing capabilities.

Access

Hatchie Refuge is a frequently visited refuge with an abundance of public interest in opportunities to enjoy its natural resources. With the National Wildlife Refuge System Improvement Act of 1997, refuges have been mandated to provide, when compatible with refuge purposes, opportunities for wildlife-dependent forms of recreation. These include hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. Therefore, attention must be given to providing the appropriate amount and forms of access for the public. Consideration should be given to access issues through increasing or limiting access opportunities, based on total resource management goals and refuge purposes.

REFUGE ADMINISTRATION AND OPERATION ISSUES

Operations and Maintenance

Funding for refuges must be prioritized and divided among more than 545 individual refuges, which comprise the National Wildlife Refuge System. Through the Refuge Operations Needs System (RONS) (Appendix III), and the Maintenance Management System (MMS) (Appendix IV), budgetary requests are forwarded and funding is assigned according to priority resource needs and budget constraints. Management decisions will continue to consider priority refuge operational needs and budgetary requests will be made, in keeping with refuge goals and purposes.

Enforcement

Large tracts of public lands may provide unique opportunities for public use, and so the continual involvement of law enforcement personnel is necessary in order to protect the resources, as well as the public. However, staff limitations preclude intensive enforcement on refuge lands. As with other refuge issues, priorities must be established, which compete for available funding and staffing. Enforcement issues should be considered and ways to improve law enforcement capabilities examined, in keeping with refuge goals and the purposes for which the refuge was established. The refuge staff cooperates with Tennessee Wildlife Resources Agency personnel and also with the Haywood County Sheriff's Department in law enforcement activities. A Service Zone Law Enforcement Officer is located at Dyersburg, but is more than an hour's drive away.

Information

Good quality, available sources of refuge information are critical to the public's appreciation and use of refuge resources. Information dissemination provides a vehicle for refuge managers to communicate to the public the many recreational opportunities available on the refuge, as well as the value of the refuge resources. Refuge management will consider ways to better provide needed information to the public and to improve existing information resources, in keeping with resource management goals and the refuge's establishing purposes.

LAND PROTECTION AND CONSERVATION ISSUES

Land Acquisition

Refuge land acquisitions provide additional protection for land and resources, as well as additional wildlife-dependent recreational opportunities for the public. The approved acquisition boundary for

Hatchie Refuge contains 11,556 acres. Public perception of federal land acquisitions is often clouded by historical instances in which eminent domain was exercised and private lands were “taken” from unwilling landowners. Land would be acquired only from willing sellers, and every effort would be made to provide effective information to the public in order to promote understanding of the refuge acquisition process. Management decisions must include acquisition priorities, as well as future management of acquired tracts in light of refuge goals and objectives, and the refuge establishing purposes.

Water Level Management

Water level management has the potential to significantly affect resources on the refuge and its immediate vicinity. Numerous hydrological issues exist in regard to agricultural drainage, flooding by beavers, and natural flooding induced by the Hatchie and Mississippi River systems. Impacts from refuge water management can include flooding, altered drainage patterns, and sedimentation. Individual water level issues will be addressed in the Habitat Management Plan on a case-by-case basis, while keeping management decisions in line with the bigger picture for the refuge and neighboring lands, as well as management goals and refuge purposes.

Protection of Unique Areas

A 1979 survey of areas planned for new facility construction and for rehabilitation of existing facilities on the Hatchie Refuge resulted in the discovery of 33 archaeological sites indicating human activity from the Early Archaic Period (about 8000 B.C.) into modern times. Five sites were recommended for further investigation to determine their eligibility for inclusion on the National Register of Historic Places. To date, this has not occurred. A comprehensive and intensive survey of the refuge is recommended to determine the actual extent and significance of the cultural resources.

Protection of Refuge Lands

The remote location of much of the refuge presents ongoing challenges to maintain clear identification of refuge boundaries. Activities that threaten refuge boundaries or lands must be addressed through enforcement and land protection measures. Management decisions must include a thorough analysis of existing or potential threats to refuge land resources. Land protection and boundary line maintenance will be performed with consideration for budgetary constraints, and in keeping with refuge goals, objectives, and establishing purposes.

III. Refuge and Resource Descriptions

REFUGE PURPOSE

The purpose for which the Hatchie Refuge was established is "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act).

TOPOGRAPHY AND CLIMATE

Hatchie Refuge is located along 23 miles of the Hatchie River in Haywood County in west Tennessee (Figure 4). The refuge encompasses the middle reaches of the Hatchie River and consists of bottomland hardwoods, moist-soil units, agricultural fields, and associated uplands. The large forested tracts, open lands, and aquatic features found on the refuge provide an important ecological niche for fish, wildlife, and plant species within the Lower Mississippi River Ecosystem. The topography of bottomlands is characteristically flat, but slight variations in elevation are associated with considerable differences in soils, drainage conditions, and forest species composition (Barrett 1980).

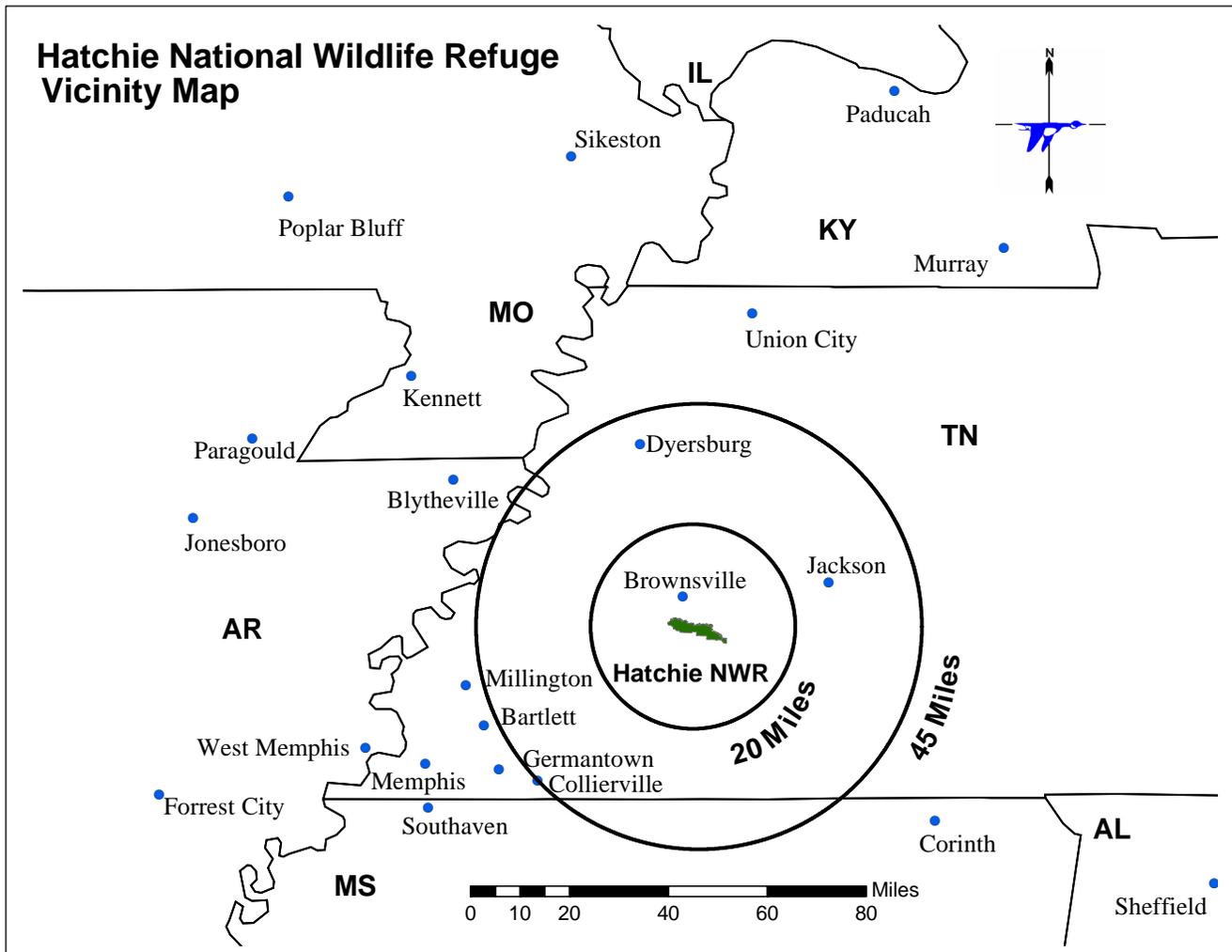
The dominant landforms of the Lower Mississippi River Ecosystem are the alluvial plain of the Mississippi River downstream of its confluence with the Ohio River, and the deltaic plain and associated marshes and swamps created by the meanderings of the Mississippi River and its tributaries. While the ecological character of the ecosystem is dominated by these landforms, valuable bottomland and upland habitats from the East Gulf Coastal Plain are contained in the drainage basin of the Hatchie and Mississippi rivers.

The Hatchie River basin lies within the west Tennessee plains, which slope gently westward from an elevation of 400 feet above mean sea level (msl) to 200 feet above msl. The basin drains about 1,664,600 acres of land and is roughly 220 miles long and 24 miles wide. The headwaters of the Hatchie River are in the State of Mississippi and flow into the Mississippi River approximately 35 miles north of Memphis, Tennessee. The river's drainage pattern is comprised of a main stream fed by many smaller streams. The floodplain of the main stream is wide and flat and narrows to a ridge and valley type of landscape in the fan-patterned area upstream. The refuge has elevations ranging from approximately 230 to 240 feet above msl along the Hatchie River.

The soils of the refuge are mainly of the Amagon - Falayar Association. These are soils of the alluvial plain, which are susceptible to flooding that continually occurs primarily in winter and spring. The soils are silty and fertile. Generally, these soils have poor drainage. These soil types are highly productive for many species of trees and highly responsive to management. Scour erosion occurs during out-of-bank flow but is probably offset by deposition of sediments. Thirteen soil series are found on Hatchie Refuge. Two major types, Amagon and Falayar, represent approximately 90 percent of the refuge. The other types occur on a more localized basis. The Soil Survey of Haywood County, Tennessee (McCowen et. al., 1995) contains additional maps and descriptions of these soil types.

The rural setting and sparse population of the refuge vicinity are characteristic of west Tennessee. The immediate location of the refuge is even less populated than most of west Tennessee, due to its location adjacent to the Hatchie River and its floodplain. Census data from 2000 indicate that Haywood County had a population of 19,797 people, which is an increase of 1.85 percent over the 1990 census (www.capitolimpact.com/gw/tncity/).

Figure 4. Vicinity map of Hatchie National Wildlife Refuge



The portion of the Hatchie River in Tennessee is one of the last unchannelized rivers of its type in the lower Mississippi River Valley, although tributaries in Tennessee and headwater portions in Mississippi have been channelized. Natural patterns of erosion and sedimentation in tributaries have been altered due to these impacts and other human disturbances. Erosion rates have increased on both upland and alluvial soils. Sedimentation has increased in swamps, brakes, oxbow lakes, and other low-lying areas. Sediment loading in streams and rivers has increased, disrupting natural patterns of aggradation and degradation.

Mild winters, hot, humid summers, and abundant rainfall characterize the refuge climate. Total annual precipitation averages approximately 51 inches, with the highest average rainfall occurring during the months of April through September. Summer and early fall are the driest periods, with the lowest rainfall occurring from July through October. In the summer, most rain falls in comparatively brief, yet intense, thunderstorms, which occur on about 53 days each year. In Haywood County, the average annual temperature is 61 degrees Fahrenheit, with average daily temperatures ranging from 38.6 degrees in January to 80.6 degrees in July. Average annual snowfall is 6 inches. The freeze-free period, or growing season, ranges from 193 to 227 days, from late March to early November (McCowan et al., 1995).

DEMOGRAPHY

Per capita income recorded for Tennessee as of 2001 was \$19,393. In Haywood County, per capita income was \$14,669. Agriculture and related service companies are the main economic bases. Several small to medium manufacturing companies are located in the county, with some of the major private employers including: Wal-Mart, the Haywood Company, Dynametal, Lowe's, and Pictsweet. Other major employers include the Haywood County Schools, and Haywood Community Park Hospital.

THREATENED AND ENDANGERED SPECIES

Part of the Service mission is to protect, enhance, and manage habitat for threatened and endangered species, in keeping with the enforcement of the Endangered Species Act. The federally threatened bald eagle (*Haliaeetus leucocephalus*) is found on or near the refuge. As many as four bald eagles winter annually on the refuge, although no active nests have been documented on refuge lands. There is no known federally listed flora on the refuge. A Section 7 Intra-Service Biological Evaluation addressing this species is found in Appendix V.

AVIAN SPECIES

Avian species are important wildlife resources with more than 200 species known to occur on the refuge and along the Hatchie River. The bottomland hardwood forests serve as important habitat for breeding and migratory birds in the spring and fall, and migratory birds occur in substantial numbers seasonally. For migratory forest breeding songbirds and shorebirds, the ecological and biological significance is transcontinental, providing breeding and migration habitat for Gulf migratory birds returning from their wintering grounds in Central and South America.

Recent studies indicate significant declines in some species of neotropical migratory bird population trends (Askins et al., 1990), while current knowledge concerning management practices for most neotropical migratory species is seriously lacking. The status of one of the most rapidly declining species, the cerulean warbler (*Dendroica cerulea*), prompted population monitoring during 2003. Additional research began in 1992 and is ongoing to assess habitats and responses of cerulean warblers in the Mississippi Alluvial Valley (Hamel et al., 1994). Neotropical migratory birds that regularly occur on Hatchie Refuge include the cerulean warbler, prothonotary warbler, and Swainson's warbler.

Approximately 32 species of shorebirds are commonly found in west Tennessee. Populations typically peak from August through October and from April to mid-May (Elliott and McKnight 2000). Shorebird species common to west Tennessee include killdeer, pectoral sandpiper, solitary sandpiper, greater yellowlegs, lesser yellowlegs, common snipe, and American woodcock. Refuge lands that provide shorebird habitat include riverine mudbars, oxbows, flooded agricultural fields, margins of reservoirs, and managed impoundments. Presently, approximately 10 acres of refuge impoundments are managed to provide shorebird habitat.

The Lower Mississippi Valley serves as the primary wintering ground for mid-continent waterfowl populations breeding in the prairies and parklands of Canada and the United States. Hatchie Refuge and adjacent lands are known to be important wintering and stop-over area for mallards using the Mississippi Flyway. Under optimum conditions, waterfowl population numbers may exceed 40,000. The value of the refuge as a waterfowl wintering area is enhanced by its proximity to other refuges. It lies within 125 miles of numerous national wildlife refuges. Other species known to use the areas include black ducks, gadwall, pintail, green-winged teal, blue-winged teal, widgeon, wood duck, ring-necked ducks and hooded merganser. Wood ducks are year-round residents and dependent on refuge habitat for nesting and brood-rearing habitat.

Approximately 11,221 acres are currently managed as a waterfowl sanctuary spread out across the refuge. Agricultural crops are raised through a cooperative farming program or by refuge staff. Under the cooperative farming program, the refuge share of crops is 25 percent (unharvested) with 75 percent (harvested) going to the farmer. Waterfowl objectives for the refuge are 500,000 goose-use days and 5.4 million duck-use days. These objectives are supported by the moist-soil units, cropland impoundments, flooded sloughs and brakes, as well as nearly the entire refuge forest, much of which is subject to inundation during high river stages.

Wild turkeys are present on the refuge, although spring flooding impacts nesting success on a regular basis. Flocks consisting of upwards of 50 turkeys are observed during high water periods, during which the birds congregate on higher ground. Mourning doves are common and bobwhite quail are occasional on open lands within and adjacent to the refuge. Common raptors include red-tailed and red-shouldered hawks, barred owls, and turkey and black vultures. American kestrels and broad-winged hawks are also present but occur less frequently.

MAMMALS

The refuge contains a diversity of mammals representing seven taxonomic orders, including pouched mammals (opossums); insect-eaters (shrews and moles); bats; flesh-eaters (raccoon); gnawing mammals (squirrels and mice); rabbits; and even-toed hoofed mammals (white-tailed deer).

Bottomland hardwood communities on the refuge are very productive for a wide variety of game and nongame mammals. Mammalian game species hunted on the refuge include white-tailed deer, raccoon, gray and fox squirrels, coyote, and swamp and cottontail rabbits. Furbearers include raccoon, beaver, opossum, river otter, muskrat, striped skunk, coyote, bobcat, gray and red foxes, and mink. Small mammal species include shrews, moles, bats, and numerous rodents, such as mice, rats, chipmunks, and flying squirrels.

Providing a diversity of habitats on the refuge contributes to healthy populations of numerous mammalian species, as well as other resident animals. Habitat management practices that focus on providing habitat for migratory birds will also benefit many resident mammals. Forest thinning and regeneration cuts provide browse for deer, and ultimately larger mast bearing trees with a greater potential for cavities for squirrels and raccoons. Managing for a diverse forest habitat will better meet the needs of all resident mammals that are dependent on forested habitats.

AMPHIBIANS AND REPTILES

Reptiles and amphibians are abundant and functionally important in most freshwater and terrestrial habitats and are significant components of the refuge and the Lower Mississippi River ecosystem. Many species of herpetofauna are wide-ranging and may serve as key indicator species in evaluating the environmental health of an ecosystem. Although no comprehensive survey of amphibians and reptiles for the refuge currently exists, comprehensive inventories are planned to establish baseline information on amphibian and reptilian species occurrence and habitat utilization. Knowledge of which species occur on Hatchie Refuge is fundamental to an understanding of the biological diversity of the area.

A comprehensive list of reptile and amphibian species for west Tennessee is found in Appendix IV (TWRA and USFWS 2001). Based on this list, over 70 species of reptiles and amphibians are expected to occur on Hatchie Refuge and its vicinity. The diverse group of amphibians, including salamanders, toads, and frogs, are well adapted to the aquatic and terrestrial environments found on the refuge, and moisture is typically important for their survival. Numerous species of reptiles, including turtles, snakes, lizards, and skinks, are also common.

A troubling indicator for the health of ecosystems worldwide is that many amphibian populations are declining. Loss and degradation of habitat are the main known causes of decline in reptile and amphibian populations in Tennessee, with the loss of wetlands and bottomland hardwood forests having the greatest negative impact on these species. Habitat fragmentation, hydrologic alteration, and excessive sedimentation are environmental problems common to west Tennessee, which negatively affect populations. Refuge land protection and management efforts serve these populations by protecting existing habitats, as well as by restoration of degraded habitats.

AQUATIC SPECIES

The sloughs, rivers, and lakes within the refuge support a diversity of game fishes, including largemouth bass, black crappie, white crappie, spotted bass, redear sunfish, bluegill, and channel catfish. Nongame species such as carp, buffalo, and drum are also present. At least 97 native fish species have been identified within the Hatchie River, making it one of the richest fish faunas of all west Tennessee rivers (Etnier and Starnes 1993; TNC 2000). The dynamic nature of the flooding regimes between the Mississippi and Hatchie rivers and the associated wetland habitats on the refuge provides a constant and renewable fishery. When flooding occurs in the spring, these areas provide good nurseries for juvenile fish. Although decades of hydrologic alteration and sedimentation have impacted aquatic resources in the refuge vicinity, land protection and habitat restoration result in positive benefits to aquatic habitats and species. The Service should emphasize projects that reduce the effects of channelization and poor land use practices through programs such as the Partners for Fish and Wildlife, Wetlands Reserve Program, Cropland Reserve Program, Forest Legacy, and The Nature Conservancy's Conservation Plan for the Hatchie River.

MUSSELS

The Hatchie River exhibits the most diverse mussel fauna of all Mississippi River tributaries in Tennessee (Parmalee and Bogan 1998). Manning (1989) reported 32 native species as occurring in the Hatchie River during his surveys in 1980-83. In addition, surveys by The Nature Conservancy in 1999 found 3 additional species, raising the total number of known species to 35 (unpublished TNC report).

As stated in the Aquatic Resources section above, hydrologic alteration and sedimentation have impacted aquatic resources, including mussels, in the refuge vicinity. Similarly, refuge land protection and habitat restoration result in positive benefits to aquatic habitats and mussel species. The Service should emphasize projects that reduce the effects of channelization and poor land use practices. In addition, a comprehensive survey of mussel populations should be conducted in refuge and vicinity waters when funding and opportunities are available.

NOXIOUS AND INVASIVE SPECIES

Kudzu is an invasive exotic species that occurs along field and forest edges, and forest openings where direct sunlight can penetrate the forest floor. This exotic vine is a native of Asia and was introduced into the United States at the Philadelphia Centennial Exposition in 1876. By 1900, kudzu was being sold through mail order suppliers as an inexpensive livestock forage. The Soil Erosion Service (now called the Natural Resources Conservation Service) distributed approximately 85 million seedlings starting in 1933 in an effort to control agricultural erosion. The U.S. Department of Agriculture removed kudzu from its cover plant list, and classified it as a common weed in 1970 (Shurtleff et al., 1977, Miller et al., 1983).

Kudzu is an aggressive vine that can grow up to 60 feet per year, forming a continuous blanket of foliage. The dense foliage often chokes out native plants and trees, alters native biotic communities,

and drastically decreases biodiversity. Today, an estimated seven million acres in the southeast are covered in kudzu. The refuge currently has several acres of kudzu on the east side of the Coffey Farm area in need of treatment.

Fire ants are becoming established on the refuge. They are believed to float in during flood stage events.

HABITATS

Refuge lands provide a variety of habitat types for a diversity of wildlife species (Figure 5). Habitats found on Hatchie Refuge consist of approximately 9,764 acres of bottomland hardwood forests, 382 acres of upland forests, 929 acres of agriculture/moist soils, 316 acres of swamps, sloughs, and streams, 46 acres of grassland, 296 acres of open water, and 110 acres of scrub/shrub habitat. The total current deeded acreage for Hatchie Refuge is 11,556 acres.

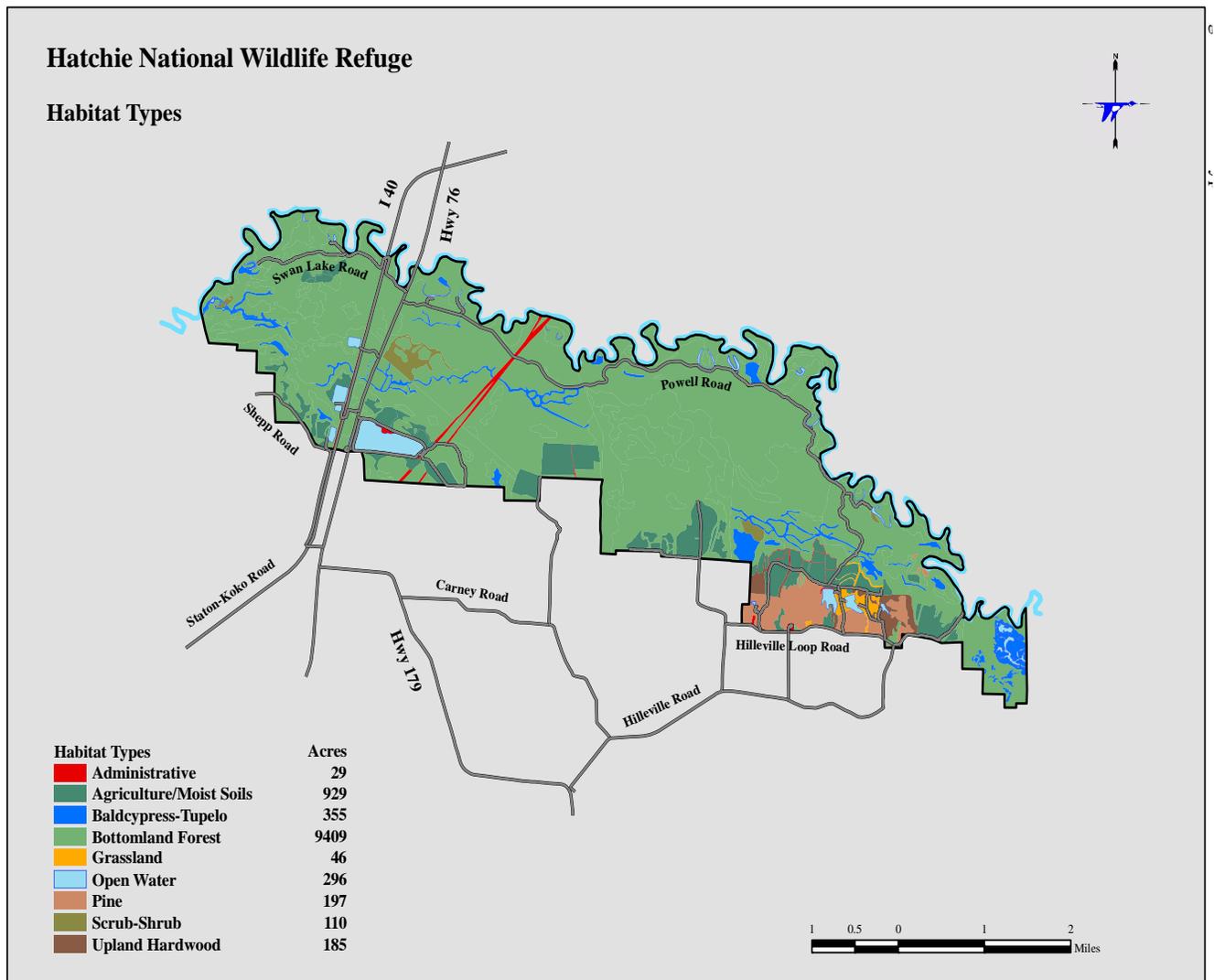
The 9,764 acres of mixed bottomland hardwoods on the refuge consist of black willow (*Salix nigra*), eastern cottonwood (*Populus deltoides*), overcup oak (*Quercus lyrata*), cherrybark oak (*Quercus pagodaefolia*), willow oak (*Quercus phellos*), water oak (*Quercus nigra*), Nuttall oak (*Quercus nuttallii*), sugarberry (*Celtis laevigata*), hackberry (*Celtis occidentalis*), bald cypress (*Taxodium distichum*), sweet pecan (*Carya illinoensis*), bitter pecan (*Carya aquatica*), sweet gum (*Liquidambar styraciflua*), and green ash (*Fraxinus pennsylvanica*). Forest management practices are used in these areas to maintain optimal diversity of forest habitat for wildlife management purposes. Mast production in the bottomland hardwood habitats provides an important food source for a wide variety of wildlife, including migratory waterfowl, deer, squirrel, and turkey. Backwater flooding during winter and spring months typically inundates thousands of acres of bottomland hardwoods, providing valuable waterfowl habitat.

Croplands are managed under cooperative agreements with local farmers who grow corn, soybeans, and winter wheat in rotation. The refuge share amounts to 25 percent and is usually planted in corn, which is left in the field for waterfowl consumption.

About 96 acres of afforested land consist of former open lands that have been planted in seedlings in 2001. Species planted on afforested lands include: Nuttall oak (*Quercus nuttallii*), willow oak (*Quercus phellos*), cherrybark oak (*Quercus falcata* var. *pagodaefolia*), water oak (*Quercus nigra*), green ash (*Fraxinus pensylvanica*), sweetgum (*Liquidambar styraciflua*), overcup oak (*Quercus lyrata*), pin oak (*Quercus palustris*), and swamp chestnut oak (*Quercus michauxii*).

The refuge currently contains approximately 316 acres of wooded swamp habitat, which is dominated by baldcypress (*Taxodium distichum*) and swamp tupelo (*Nyssa aquatica*) in the overstory, and with buttonbush (*Cephalanthus occidentalis*) found most abundantly in the understory. In the 296 acres of open water habitat found on the refuge, dominant vegetation includes submerged aquatics, such as elodea (*Elodea canadensis*), curlyleaf pondweed (*Potamogeton crispus*), bladderwort (*Utricularia* spp.), and coontail (*Ceratophyllum* spp.); and emergents, such as American lotus (*Nelumbo lutea*), cowlily (*Nymphaea advena*), duckweed (*Lemna* spp.), and waterfern (*Azolla Carolinia*).

Figure 5. Habitat types on Hatchie National Wildlife Refuge



Upland hardwood forest habitat (approximately 382 acres) is found primarily along the southeastern edge of the refuge and consists primarily of southern red oak (*Quercus falcata*), sweetgum, yellow polar (*Liriodendron tulipifera*), post oak (*Quercus stellata*), white oak (*Quercus alba*), American elm, various hickories (*Carya spp.*), and American beech (*Fagus grandifolia*).

Approximately 46 acres of cool season grasses have been converted to native warm season grasses. Dominant species include switchgrass (*Panicum virgatum*), little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), broomsedge (*Andropogon virginicus*), partridge pea (*Cassia fasciculata*), Indian grass (*Sorghastrum nutans*), goldenrod (*Solidago altissima*), common ragweed (*Ambrosia artemisiifolia*), and giant ragweed (*Ambrosia trifida*). Sweetgum trees and other species are invading these fields and maintenance will be needed to keep the fields in grassland.

EDUCATION AND VISITOR SERVICES

Since the passage of the National Wildlife Refuge System Improvement Act of 1997, the refuge has adopted hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation as the six priority general public uses. These uses, as such, are the primary focus of management. As funding and staffing allow, programs will be developed to increase appropriate and compatible visitor use awareness and appreciation of fish and wildlife resources.

Wildlife-dependent recreation currently available on the refuge includes wildlife observation (by hiking, boating, or driving on established roads), hunting, fishing, and photography. Wildlife observation, hunting, and fishing have been the primary uses on the refuge since its inception and encompass the majority of public use. The staff also provides environmental education and interpretive programs when requested by local civic and school groups. Currently, there are no interpretive facilities on the refuge.

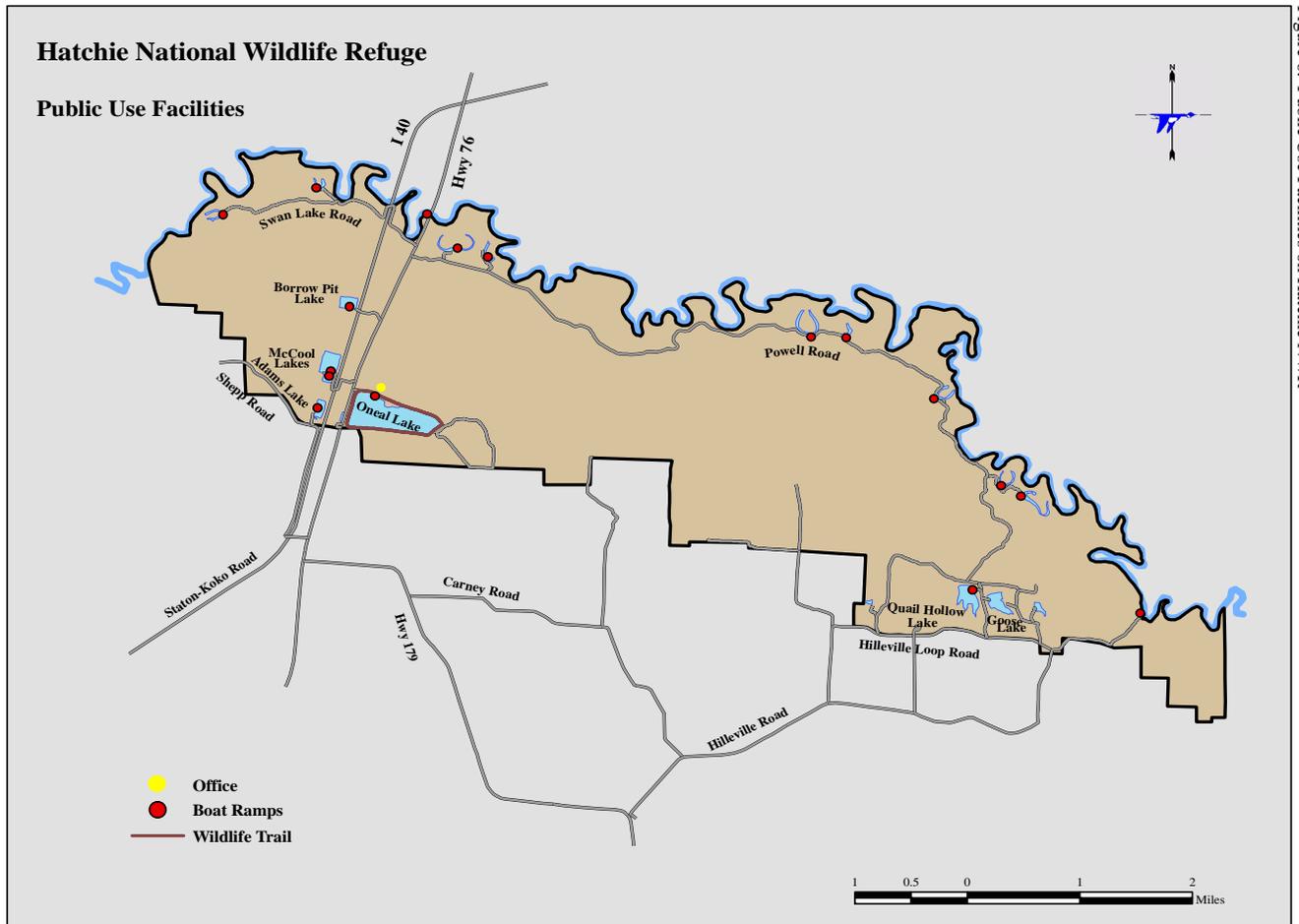
In Fiscal Year 2003, the refuge received about 25,000 visitors, although visitor use data are limited. The refuge is open during most of the state hunting seasons, with some exceptions and restrictions, which apply to certain hunts. Fishing is permitted all year according to state regulations with certain restrictions. National wildlife refuges are closed to public use activities by law, unless expressly permitted. Hunting, fishing, wildlife observation, and photography are permitted on most areas of the refuge. Of particular importance is the Project Fish area at Oneal Lake. A series of universally accessible fishing piers has been developed for anglers of all abilities. The Whistling Wings Wildlife Drive, a 2.2-mile auto tour route, encircles Oneal Lake. Interpretive facilities are planned, but not yet funded. All public access is prohibited in the waterfowl sanctuary areas (Windrow field, Coffey Farm area, and Hillville area) from November 15 through March 15. Figure 6 shows the existing public use facilities found at Hatchie Refuge.

There are numerous other public lands within commuting distance that offer wildlife-dependent recreation experiences. Eight other national wildlife refuges, including Reelfoot (10,428 ac.), Lake Isom (1,846 ac.), Chickasaw (25,041 ac.), Lower Hatchie (9,452 ac.), Tennessee (51,359 ac.), Cross Creeks (8,861 ac.), and Clarks River (7,467 ac.), are located within a 2-hour drive of Hatchie Refuge (acreages as existed on September 30, 2004, and listed in the Division of Realty database, <http://refugedata.fws.gov/databases/>). Hatchie Refuge provides excellent birding opportunities within the scenic Hatchie River bottoms. The Hatchie River, which traverses through both Hatchie and Lower Hatchie refuges, is a state-designated scenic river and is the only unchannelized river remaining in west Tennessee (however, the portion of the river that resides in Mississippi has been channelized).

Fishing opportunities are found at each national wildlife refuge, with facilities including fishing piers, boat ramps, and bank fishing areas. Hatchie and Reelfoot refuges offer universally accessible fishing areas. Waterfowl hunting, as well as big and small game hunting, is offered on each west Tennessee refuge.

The Tennessee Wildlife Resources Agency manages more than 600,000 acres of state wildlife management areas and state wildlife refuges in Tennessee, and all offer some fishing, hunting, and wildlife observation opportunities. Nearby are the 12,000-acre Anderson Tully, 3,400-acre Moss Island, and 7,000-acre Tigrett state wildlife management areas. The State of Tennessee allows use of both modern and primitive weapons, and in the 2002-03 hunting season the state offered a total of 43 days of modern gun deer hunting, 53 days of muzzleloader deer hunting, and 105 days of archery deer hunting in west Tennessee. Most west Tennessee wildlife management areas are also open to waterfowl and small game hunting.

Figure 6. Public use facilities on Hatchie Refuge



REFUGE ADMINISTRATION

Refuge administration refers to the operation and maintenance of refuge programs and facilities, including new construction. The refuge staff currently consists of four permanent employees: Assistant Refuge Manager, Office Assistant, and two Engineering Equipment Operators. When funding allows, up to three temporary employees (two equipment operators and one YCC employee) supplement the refuge staff. The staff's efforts are primarily focused on protection and restoration of critical habitats, especially bottomland hardwood forests, through cropland and forest management. The Draft Habitat Management Plan provides an inventory of existing forest resources and long-term plans for management of these resources to maximize their value as habitat for a diversity of wildlife species. Providing quality habitats for migratory birds is the primary management activity.

The staff also coordinates extensively with landowners, conservation organizations, local agencies, and civic groups, attending meetings and providing presentations as needed to local groups. The staff's current public information efforts concentrate on keeping the public informed regarding public use opportunities and refuge activities.

The refuge office/visitor contact station was constructed in 2003 and is located at Oncal Lake. A shop site, including a 3-bay maintenance building with an office and storage barn, is located in the

Hillville area. The shop site also contains one safety storage shed for hazardous materials, a wood shop building, above-ground gas and diesel fuel tanks, and two pole sheds for equipment storage. Two surplus campers were obtained for temporary personnel (volunteers, interns, researchers, etc.), however, only one is currently set up for use.

Hatchie Refuge is accessible by a system of state and refuge roads. Interstate 40 and State Highway 76 pass through the western end of the refuge. County roads that provide access to various parts of the refuge include the Carney Road, Hillville Loop Road, Quarter Road, and Shepp Road. Public use facilities include a 2.2-mile auto-tour route around Oneal Lake, about 30 miles of public use roads, 3 universally accessible fishing piers, 15 boat ramps to access oxbow lakes and reservoirs, and 2 boat ramps to access the Hatchie River.

In addition to normal refuge road maintenance activities, the 1998 Transportation Equity Act for the 21st Century (TEA-21) provides funding for National Wildlife Refuge System roads under the Federal Lands Highway (FLH) program. Hatchie Refuge staff coordinates with Federal Highway Administration officials to assess refuge roads for possible enhancements or improvements with TEA-21 funding. Congress requires that projects must be compatible with comprehensive management plans and must minimize impacts on refuge operations. The Federal Highway Administration is available to assist the Service in planning, design, and contract administration. Recent projects included the replacement of eight bridges and the reconstruction of five highway ramps in 2003.

ARCHAEOLOGICAL OR CULTURAL RESOURCES

During the early historic period, the Chickasaw Indians occupied the portion of western Tennessee that included the Hatchie Refuge. Initial European explorations included visits by the Spanish explorer De Soto in 1540 and the French explorer La Salle, who made contact with the Chickasaw Indians in the vicinity of current Fort Pillow State Park in 1682 (Anderson 1995). After the American Revolution, the lands occupied by the Chickasaw were ceded to the new United States government, which made peace with the Chickasaw in 1786. In 1818, the Chickasaw Nation ceded all claim to lands in Tennessee, and, in 1837, all remaining Chickasaw people east of the Mississippi were removed to reservations in the west.

An archaeological review on Hatchie Refuge was conducted in 1979; however, actual field investigations were confined to various project impact areas. The field survey resulted in the discovery of 33 archaeological sites indicating human activity in the refuge from the Early Archaic Period into modern times. Five sites were recommended for further investigation to determine their eligibility for inclusion on the National Register of Historic Places.

Prior to refuge ownership, timber harvesting and road construction, as well as agricultural activities, may have adversely impacted archaeological deposits associated with many sites on the refuge. Oral history interviews and documentary research could provide a wealth of information regarding the refuge and the county.

LAND PROTECTION AND CONSERVATION

All tracts acquired by the Service are removed from the local real estate tax rolls because Federal Government agencies are not required to pay state or local taxes. However, the Service makes annual payments to Haywood County in lieu of real estate taxes, as required by the Refuge Revenue Sharing Act (Public Law 95-469). Payment for acquired land is computed on whichever of the following formulas is greatest: (1) three-fourths of 1 percent of the fair market value of the lands

acquired in fee title; (2) 25 percent of the net refuge receipts collected; or (3) 75 cents per acre of the lands acquired in fee title within the county.

Of the 341,277 acres in Haywood County, 211,984 acres consist of cultivated croplands, and 15,178 acres consist of forests. There are approximately 360 farms in Haywood County (average size of 589 acres) (<http://agcensus.mannlib.cornell.edu/show2.php>). Lands immediately adjacent to the refuge are privately owned and managed for farmland and hunting clubs. The surrounding farmland is farmed primarily for soybeans, cotton, wheat, corn, and milo. Farm commodity prices, in general, have decreased since the mid-80s and more dramatically since the passage of the 1996 Farm Bill. Poor farm production, drought, and low commodity prices in recent years have encouraged many producers to sell their farms and/or enroll them in some kind of conservation program.

Private lands enrolled in conservation programs contribute significantly to wildlife conservation. The Service has an active partnership with several agencies and organizations to enroll private lands in these programs, and private land enrollment in conservation programs will continue to be encouraged to augment Service program and mission requirements.

A study of contaminants occurring on 26 national wildlife refuges in the Lower Mississippi River Ecosystem (LMRE) was conducted by North Carolina State University (Shea et al., 2001). Although Hatchie Refuge was not one of the refuges studied, just downstream the Lower Hatchie Refuge was studied. Samples of water, sediment, and fish were collected, and sampling devices that accumulate persistent organic chemicals were employed. Organochlorine pesticides (OCPs), which include DDTs, toxaphene, mirex, endrin, dieldrin, and numerous other pesticides, were detected at every refuge, but on Lower Hatchie Refuge total levels of DDT and toxaphene were well below published levels for the protection of fish or wildlife in both predator and benthic fish species. Mixtures of multiple pesticides were often detected in refuges within the Lower Mississippi River Ecosystem, and their detection frequency was clearly associated with their use and persistence. Total polychlorinated biphenyl (PCBs) values in sampled predator and benthic fish and in sampled sediment and water were well below published levels. Total polycyclic aromatic hydrocarbons (PAHs) in sediment and water samples are low throughout the region, except near oil and gas production facilities, which do not occur on or near Lower Hatchie Refuge. Mercury levels in sediment, and predator and benthic fish samples were well below threshold levels for fish-eating mammals and birds. Current use pesticides (CUPs) (includes herbicides such as 2, 4-D, atrazine, and numerous others; and insecticides such as diazinon, malathion, and numerous others) were detected at every refuge, but at only one-half the frequency as nearby off-refuge areas. On Lower Hatchie refuge, water samples indicated the presence of three CUPs at levels below the aquatic life criteria. On nearby lands outside the refuge, CUPs were not found at levels which exceeded aquatic life criteria. According to the Shea study, hazards associated with CUPs are less certain due to limitations of sampling techniques. Additional data are probably necessary to perform a quantitative risk assessment (Shea 2001). In summary, Lower Hatchie refuge tests indicated no likely hazard in regard to PAHs, but further testing may be needed to accurately determine possible risks associated with OCPs, PCBs, and CUPs. This study would be indicative for Hatchie Refuge as well, since the two refuges are very similar.

A study of ecological contaminants found on six national wildlife refuges in west Tennessee published by the Service's Ecological Services Office in Cookeville, Tennessee, detected 12 metals in the 5 fish samples taken from Hatchie Refuge (Robison et al., 1997). DDT was detected only at Hatchie Refuge. Although DDT, DDE, and DDD were all detected in 4 of the 5 fish samples, "... all DDE concentrations were well below the FDA Tolerance Level of 5.0 ppm, which applies to fillet portions and total DDT concentrations." Mercury concentrations ranged from 0.222 ppm in spotted sucker to 0.5 ppm in spotted gar. Mercury was slightly higher in the spotted gar sample from Powell Lake. The average concentration of mercury in fishes was found to be 0.384 ppm. Only Lower Hatchie Refuge had higher average mercury concentrations.

REFUGE-RELATED PROBLEMS

Bottomland hardwood forests within the Mississippi Alluvial Valley (MAV) provide habitat for a rich diversity of wildlife species. The loss of bottomland hardwood forests has been great. By 1978, of 24 million acres of forested wetlands originally in the MAV, only about 5 million acres remained (MacDonald et al., 1979). Today, over 80 percent of the MAV lands are in agricultural production (Twedt et al., 1999). Remaining forested lands are typically isolated patches surrounded by agriculture. More than 35,000 forest patches exist in the MAV; of these, the average size is less than 100 acres and less than 1 percent is greater than 10,000 acres. Agricultural practices in the vicinity of Hatchie Refuge have resulted in large-scale clearing and fragmentation of bottomland hardwood forests, which equates to significant losses and degradation of valuable wildlife habitat.

Hatchie Refuge was formerly owned by a variety of landowners, including the Powell Timber Company, and other private landowners. A forest habitat inventory was completed in 1976, however, loss of volume due to salvage sales, sedimentation, and beaver impacts, and growth of the remaining timber have changed the condition of the forest.

Refuge-specific inventories of flora and fauna are limited. Comprehensive surveys of refuge flora and fauna should be completed as funding and opportunities are available.

Massive navigation and flood-control works have severely impacted the natural processes of the Mississippi River. It has been straightened and channelized for decades, significantly reducing the meanders of the natural river channel and limiting the amount of overbank flooding, which occurred historically. Even though the main stem of the Hatchie River in Tennessee has never been channelized, numerous channelized tributaries affect the river's hydrology through the deposit of huge sediment loads. As a result, the physical and biological interaction between the rivers and floodplain has been impacted and much of the natural hydrologic functioning of the system has been significantly affected.

CONSERVATION PRIORITIES

Priorities identified for Hatchie Refuge include continued emphasis on habitat for migratory waterfowl, bottomland hardwood forests, and an increased emphasis on habitat for migratory songbirds.

The importance of the Lower Mississippi Valley as the primary wintering ground for mid-continent waterfowl populations serves to reinforce the value of Hatchie Refuge for migrating waterfowl. The refuge and adjacent lands are known to be important wintering and stop-over areas for mallards using the Mississippi Flyway, and the value of the refuge as a waterfowl wintering area is enhanced by its proximity to other refuges. The refuge was authorized by the Migratory Bird Conservation Act of 1929 for "...use as an inviolate sanctuary or for other management purposes, for migratory birds." Management of impoundments, agricultural lands, moist-soil units, and bottomland hardwood forests will be carried out with an emphasis on providing habitat for migrating waterfowl.

The vast amounts of clearing and fragmentation of forests in the MAV underscores the importance of Hatchie Refuge as a part of the largest complex of bottomland hardwood forests remaining in west Tennessee. A priority is placed on protection and maintenance of bottomland hardwood forests on the refuge. Refuge forest management activities maintain and increase the red oak component of the forest and develop uneven-aged management of stands, which provide a diversity of habitats for numerous species of wildlife.

Significant declines in populations of many neotropical songbirds serve to emphasize the importance of forest habitats for species, which migrate through the Lower Mississippi Valley. Emphasis will continue to be placed on the study and management of refuge forests for these species. Management efforts to enhance existing forests for songbirds will continue to be a priority on the refuge. Migratory birds that are considered to be focal species for the refuge include swallow-tailed kite, cerulean warbler, and Swainson's warbler.

Focal wildlife species will continue to be managed in support of goals and objectives developed for the Lower Mississippi River Ecosystem (USFWS 2002). Resource goals and objectives developed cooperatively with the State of Tennessee (TWRA and USFWS 2001) will continue to be priorities in the future planning and management of refuge lands. The Service will continue to work with partners and landowners to achieve common goals and form conservation partnerships. One other such partnership involves the Natural Resources Conservation Service, and landowner participation in the Wetlands Reserve Program and the Cropland Reserve Program will assist the Service in meeting wildlife objectives through the restoration of thousands of acres in the vicinity of the refuge.

SPECIAL MANAGEMENT AREAS

Various records were found in the refuge files that discuss two proposed public use natural areas.

In 1982, the Forest Management Plan for Hatchie Refuge was amended to read: "A baldcypress-water tupelo natural area has already been set aside. We are recommending that this 31-acre natural area be increased to 200 acres; and that another 133-acre natural area be established near Cut-off Lake." (Forest Management Plan Amendment, pg. 2). "It is recommended that the 31-acre Baldcypress-Water Tupelo Natural Area in Compartment 8 be increased to 200 acres." (Forest Management Plan Amendment, pg. 4). "The other Natural Area is located on the Shannon tract in Compartment 8. This area is approximately 133 acres in size and supports an unusually good stand of sawtimber." (Forest Management Plan Amendment, pg. 4).

The 1983 Annual Narrative stated that in October (1983), two areas totaling 337 acres on the east end of the refuge were set aside from active forest management to preserve their high aesthetic value. The Pike Hole Public Use Natural Area is shown as 200 acres in size. While no size is shown for the Shannon Ridge Public Use Natural Area, 337 acres minus 200 acres equals 137 acres.

The 1984 Annual Narrative states, "In 1982, two areas totaling 237 acres on the east end of the refuge were set aside from active forest management to preserve their high esthetic value."

The 1985 Annual Narrative states, "The two sites, totaling 700 acres were set aside from active forest management in 1982 to preserve their esthetic value."

While the acreage change in the various documents is confusing, the public use natural areas were never approved because the program was discontinued (Marvin Nichols, personal communication). These areas will be reevaluated and the status will be addressed through the Habitat Management Planning process or Annual Habitat Work Plans.

WILDERNESS REVIEW

Refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process. The Wilderness Act of 1964 defines a wilderness area as an area of federal land that retains its primeval character and influence, without permanent improvements or human inhabitation, and is managed so as to preserve its natural 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 the Hatchie National Wildlife Refuge were reviewed for their suitability in meeting the criteria for wilderness, as defined by the Wilderness Act of 1964. No lands in the refuge were found to meet these criteria. Therefore, the suitability of refuge lands for wilderness designation is not further analyzed in this plan.

IV. Management Direction

INTRODUCTION

The Service endeavors to manage fish and wildlife and their habitats, while considering the needs of the complete spectrum of natural resources in the decision-making process. But first and foremost, fish and wildlife conservation assumes priority in refuge management. A requirement of the National Wildlife Refuge System Improvement Act of 1997 is for the Service to maintain the ecological health, diversity, and integrity of national wildlife refuges. Refuges in the Lower Mississippi Valley include managed bottomland hardwood forests and moist-soil areas, and are vital links in the overall function of the ecosystem. To offset the historic and continuing loss of these habitats within the ecosystem, the refuge and other public lands provide the biological “safety-net” for migratory non-game birds and waterfowl, threatened and endangered species, and resident species.

REFUGE VISION

Wildlife and biological communities found on the refuge form the basis for the future management of refuge lands. The following vision statement developed collaboratively by the planning team, with input from the refuge staff and the public, describes the desired future conditions and management emphasis for the Hatchie Refuge:

“To protect and enhance an excellent example of a fully functioning, river-driven bottomland hardwood ecosystem that supplies critical habitat needs for wintering waterfowl and other migratory birds, as well as a host of other fish and wildlife species, and provides refuge visitors the opportunity to learn the value of this unique and diminishing habitat.”

REFUGE GOALS

The following goals were developed in keeping with the vision for the refuge and purposes for which the refuge was established:

- Goal 1 (Waterfowl): Provide a complex of managed wintering and migration habitats for waterfowl that support the population goals and objectives established in the North American Waterfowl Management Plan, Lower Mississippi Valley Joint Venture Plan, and the West Tennessee Wildlife Resources Conservation Plan.
- Goal 2 (Endangered and Threatened Species): Protect, manage, and enhance refuge habitats in a manner that will sustain or increase species’ populations.
- Goal 3 (Migratory Landbirds): Provide a complex of habitats which meet the breeding, migration, and wintering needs of the species of management concern, as identified in the goals and objectives of the Partners-In-Flight Plan and the West Tennessee Wildlife Resources Conservation Plan.
- Goal 4 (Shorebirds and Waterbirds): Provide a complex of managed habitats for shorebirds and waterbirds during critical periods throughout the year to increase bird use on the refuge and develop a traditional use site.

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- Goal 5 (Aquatic Resources): Maintain or improve aquatic habitat quantity, quality, and diversity to sustain or increase population levels of aquatic resources on the refuge in accordance with the West Tennessee Wildlife Resources Conservation Plan and other Service aquatic resource plans.
 - Goal 6 (Resident Wildlife): Provide a complex of habitats suitable for a wide range of resident (endemic) wildlife species, including mammalian, avian, amphibian, and reptilian species, while achieving habitat management objectives and biological integrity with other native flora and fauna.
 - Goal 7 (Public Use): Enhance public use of the refuge through development of an appropriate and compatible program of wildlife-dependent recreation and education/interpretation that is consistent with the National Wildlife Refuge System Improvement Act of 1997, and that will promote an understanding of the Lower Mississippi River Valley ecosystem.
 - Goal 8 (Administration and Operation): Ensure that present and future operational, administrative, and personnel objectives are achieved in order that goals and objectives for refuge habitats, fish and wildlife populations, land conservation, and visitor services will be achieved.
 - Goal 9 (Land Protection and Conservation): Protect natural and cultural resources through partnerships and land acquisitions and in accordance with federal and state historic preservation legislation and regulations.

COMPREHENSIVE CONSERVATION PLAN - SUMMARY STATEMENT

This proposed management plan was derived from Alternative D of the Environmental Assessment. The refuge would be managed using an ecosystem management approach that preserves the environmental health and diversity of natural resources on the refuge. At the same time, opportunities would be examined to allow greater access for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

During the planning process, oral and written comments received conveyed both a desire for increased public access and recreation and a desire to preserve the diverse flora and fauna of the refuge. The decisions to allow or prohibit certain uses were dependent upon the compatibility of those uses (whether the proposed uses would have an adverse effect on the natural resources of the refuge), the establishing purposes for the refuge, and the professional judgment of the refuge staff and planning team.

This management plan outlines how wildlife and habitats would be managed and enhanced by the refuge over the next 15 years. The goals, objectives, and strategies acknowledge that the refuge is a portion of the much larger Lower Mississippi River Ecosystem. The actions considered and taken in implementing this plan would affect the remaining Lower Mississippi River Ecosystem, natural areas which surround the refuge, and nearby municipalities and landowners.

Crucial elements of this plan include managing wintering and migration habitats for wintering waterfowl and other migratory birds. Management of moist-soil units, croplands, and bottomland hardwood forests, as well as acquisition and management of additional lands, would ensure that the refuge supports the population goals and objectives established in numerous regional plans, including the North American Waterfowl Management Plan, the Lower Mississippi River Joint Venture Plan, and the West Tennessee Wildlife Resources Conservation Plan. Waterfowl impoundments, including moist-soil units and flooded fields, would be managed to provide seasonal habitat for migratory shorebirds.

Protection and management of refuge forests and grasslands would support target populations of migratory landbirds and support populations goals and objectives established in the Partners-In-Flight Plan and the West Tennessee Wildlife Resources Conservation Plan. Cooperative efforts with other agencies and non-governmental organizations would be undertaken to assemble a 20,000-acre block of contiguous bottomland hardwood forest along the Hatchie River.

Active forest management would maximize the ability of the refuge forest lands to benefit all resident and migratory species. Protection of aquatic resources would promote self-sustaining fish populations and aquatic habitats necessary for resting, foraging, and breeding for resident and migratory wetland-dependent wildlife species. Inventory and monitoring of threatened and endangered species would continue and resource protection and management would contribute to their recovery.

The environmental education and outreach program would be enhanced to showcase the Lower Mississippi River Ecosystem, and a wide range of partnering opportunities would be actively pursued and fostered to share in the protection of natural and cultural resources. Public use facilities, including a visitor center, boat ramps, observation platforms, kiosks, and trails would be developed to enhance public access and appropriate and compatible wildlife-dependent recreation.

GOALS, OBJECTIVES, AND STRATEGIES

The goals, objectives, and strategies presented below are the Service's response to the issues and concerns expressed by the planning team, the public at open meetings, and to other comments submitted by the public. All issues discussed during the scoping process are listed in Appendix VII and responses to relevant comments received will be addressed in the final plan. Following each goal is a list of objectives, and under each objective is a listing of strategies. The Plan Implementation section shows the support projects for the goals in priority order.

These objectives and strategies reflect the Service's commitment to achieve the mandates of the National Wildlife Refuge System Improvement Act of 1997, the missions of the National Wildlife Refuge System, the Lower Mississippi River Ecosystem Plan, the North American Waterfowl Management Plan, the West Tennessee Wildlife Resources Conservation Plan, the Conservation Plan for the Hatchie River, the refuge's vision, and the specific purposes for which Hatchie Refuge was established. With adequate staffing and funding as outlined in the Plan Implementation section, the Service intends to accomplish these goals, objectives, and strategies during the next 15 years.

GOAL 1 -- (WATERFOWL)

Provide a complex of managed wintering and migration habitats for waterfowl that support the population goals and objectives established in the North American Waterfowl Management Plan, Lower Mississippi Valley Joint Venture Plan, and the West Tennessee Wildlife Resources Conservation Plan.

Objective 1.1: Through the management of existing refuge lands and resources, as well as the acquisition from willing sellers, development, and management of additional lands identified in the current approved acquisition boundary, provide migration and wintering habitats to support 5.4 million duck-use days and 500,000 goose-use days annually, based on a 110-day wintering period, in addition to year-round habitat for resident wood ducks.

Guidelines for minimum duck-use days were predicted by the use of a series of step-down plans, starting with population objectives developed in the North American Waterfowl Management Plan. These values were stepped down to the Lower Mississippi Valley Joint Venture, which in turn

determined minimum foraging requirements that needed to be met to support the established goals of the North American Waterfowl Management Plan, and these foraging requirements were then allocated to each state within the Joint Venture. Within each state, coordination meetings were held to allocate the needed habitat requirements among public and private lands. Taking into account sanctuary and foraging requirements, public land managers determined what potential existed on various managed lands to meet the state objectives. For Hatchie Refuge, these potential objectives were adjusted based on multi-species duck life history requirements, goose life history requirements, and refuge purposes and capabilities.

- Strategy 1.1.1: Maintain the current core waterfowl management area (11,221 acres) as an inviolate sanctuary for waterfowl and other migratory birds where little to no disturbance factors is allowed during the critical winter period (November to March).
- Strategy 1.1.2: Manage 929 acres of moist-soil/agricultural areas, through water manipulation, mechanical, and chemical treatments, to provide quality moist-soil habitat and high energy food resources for waterfowl.
- Strategy 1.1.3: Manage refuge forests to increase the red oak component on suitable sites in the red oak and potential red oak management units to 60 percent of the basal area.
- Strategy 1.1.4: Continue afforestation efforts and establish red oak and other mast species on newly acquired lands that are not scheduled for water management development.
- Strategy 1.1.5: Manage existing greentree reservoirs by emulating natural hydrological cycles to ensure tree vigor, productivity of the unit, and provide habitat for migratory waterfowl.

GOAL 2 -- (ENDANGERED AND THREATENED SPECIES)

Protect, manage, and enhance refuge habitats in a manner that will sustain or increase species' populations.

Objective 2.1: Enhance, restore, protect, and manage imperiled species' habitat using appropriate conservation tools, including habitat management on 11,556 acres of existing refuge lands.

Part of the Service's mission is to protect, enhance, and manage habitat for threatened and endangered species, in compliance with the Endangered Species Act. Refuge resource management emphasizes the protection of threatened and endangered species and efforts to protect and manage their habitats will be undertaken.

- Strategy 2.1.1: Provide habitat to support the recovery of the threatened bald eagle through approved land acquisitions and resource management actions.
- Strategy 2.1.2: Enhance, restore, protect, and manage imperiled species' habitat using all available conservation tools, including habitat management on existing lands (federal, state, and private), conservation easements, partnership agreements, and conservation agreements.

GOAL 3 -- (MIGRATORY LANDBIRDS)

Provide a complex of habitats, which meets the breeding, migration, and wintering needs of the species of management concern, as identified in the goals and objectives of the Partners-In-Flight Plan and the West Tennessee Wildlife Resources Conservation Plan.

Objective 3.1: Through management of up to 11,556 acres of refuge land, provide sufficient habitat to support species of management concern, and work with partners toward the assemblage of a 20,000-acre block of forested land in west Tennessee within the next 15 years.

Priority forest blocks were mapped to guide establishment of sustainable populations of priority forest interior-nesting migratory songbirds by Partners-In-Flight and its cooperating partners. The East Gulf Coastal Plain Habitat Conservation Plan has identified two patches that, with varying amounts of reforestation, could provide forest patches of 20,000 along the Hatchie River. Resource professionals believe that forest patches in this category are the minimum size suitable to support breeding populations of various neotropical songbirds. In some cases, even larger forest patches may be needed to support breeding neotropical songbird populations. This may be true where the shape and/or isolation of a particular forest patch may dictate the need for even larger forest acreage in order for the patch to be of adequate size. Hatchie Refuge is located in one of these 20,000-acre forest blocks designated by Partners-in-Flight within the East Gulf Coastal Plain. These large forest blocks also are expected to support other less area sensitive forest-nesting migratory birds as well.

- Strategy 3.1.1: Develop and maintain a diversity of bottomland forest structure through sound silvicultural management.
- Strategy 3.12: Manage upland forests to provide quality habitat for migratory birds.
- Strategy 3.1.3: Manage 46 acres of grasslands to provide quality habitat for migratory landbirds and provide additional grassland habitat where appropriate on newly acquired lands.
- Strategy 3.1.4: Expand the acquisition boundary to include those lands needed to meet refuge and regional wildlife resource objectives as identified in refuge, regional, and national plans.

GOAL 4 -- (SHOREBIRDS AND WATERBIRDS)

Provide a complex of managed habitats for shorebirds and waterbirds during critical periods throughout the year to increase bird use on the refuge and develop a traditional use site.

Objective 4.1: Provide a minimum of 100 acres of shorebird habitat during spring migration, 10 acres during fall migration, and a minimum of 10 acres of waterbird habitat during summer in managed impounded wetlands within 3 years of this plan's approval.

Shorebirds annually migrate through the LMRV from the southernmost parts of South America to the northernmost parts of North America. Foraging habitat (mudflats and shallow water areas) objectives were recommended for fall migrating shorebirds by the U.S. Shorebird Working Group and a smaller group of shorebird experts working in the LMRV (Elliott et al., 2001). These ecosystem objectives were then stepped down to private and public lands.

Foraging habitat is not considered limiting during the spring migration when river stages are typically falling and mudflats are common throughout the LMRV, but fall habitats can be critical due to the lack of available sheet water along the flyway. However, the West Tennessee Wildlife Resources Conservation Plan identified zero acres of fall shorebird habitat for Hatchie Refuge. Although no shorebird habitat acres were identified for the refuge, management activities aimed at waterfowl commonly provide fall foraging opportunities for shorebirds. Refuge complex staff recognized this opportunity to provide habitat, thus, refuge management schemes have been implemented to furnish additional acreage during the critical fall shorebird migration period.

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- Strategy 4.1.1: Manage a minimum of 100 acres of shallowly flooded mudflat habitats with < 25 percent vegetative cover and varying water levels (< 8 in) to support shorebirds during spring migration (March to early June).
 - Strategy 4.1.2: Provide a minimum of 10 acres of shallowly flooded mudflat habitats with < 25 percent vegetative cover and varying water levels (< 8 in) during fall migration (late June to October).
 - Strategy 4.1.3: Identify a minimum of 10 acres of impounded wetlands in management unit 8 (Map 3) to provide shallow water feeding areas for wading birds and marshbirds during summer.

GOAL 5 -- (AQUATIC RESOURCES)

Maintain or improve aquatic habitat quantity, quality, and diversity to sustain or increase population levels of aquatic resources on the refuge in accordance with the West Tennessee Wildlife Resources Conservation Plan and other Service aquatic resource plans.

Objective 5.1: Conserve, restore, and manage up to 296 acres of open water wetlands (e.g., lakes, sloughs, and side channels), and 9,764 acres of seasonally flooded bottomland hardwood forest to provide resting, foraging, and breeding habitats for resident and migratory wetland-dependent wildlife species, including native fish and invertebrates. Provide opportunities for recreational harvest of selected fish species on the refuge.

The refuge lies within the flood plain of the Hatchie River, which regularly flows through the refuge when the river reaches flood stage. The dynamic nature of this flooding regime and the associated wetland habitats provide diverse and renewable resources within the numerous aquatic features on the refuge. The creeks, sloughs, and lakes within the project areas support a diversity of game and nongame fishes. When flooding occurs in the spring, these areas provide good nurseries for juvenile fish, breeding areas for frogs and toads, and feeding areas for reptiles. Through conservation, restoration, and management of lands and aquatic resources on the refuge, critical habitats are made available for resting, foraging, and breeding for resident and migratory wetland-dependent and aquatic wildlife species.

- Strategy 5.1.1: Restore and maintain natural secondary channels, oxbows, natural banks, sloughs, and backwater areas that connect to the Hatchie River.
- Strategy 5.1.2: Improve water quality and reduce annual flood damage by restoring flood plain hydrology on newly acquired lands where agricultural drainage is no longer needed.
- Strategy 5.1.3: Promote the enhancement and protection of riparian corridors.
- Strategy 5.1.4: Manage for sustainable harvest of recreational fish species.

GOAL 6 -- (RESIDENT WILDLIFE)

Provide a complex of habitats suitable for a wide range of resident (endemic) wildlife species, including mammalian, avian, amphibian, and reptilian species, while achieving habitat management objectives and biological integrity with other native flora and fauna.

Objective 6.1: Conserve, restore, and manage up to 11,556 acres of refuge lands to support resident wildlife species and population levels identified in the West Tennessee Wildlife Resources Conservation Plan.

In keeping with refuge management objectives and establishing purposes, sound biological principles are used in the assessment of, and when feasible, management of resident species. In some resident species' groups, little specifically targeted resource management is performed other than monitoring, protection, and awareness of any species of special concern that may exist on the refuge. However, management for priority habitat conditions often results in good management for a host of resident species. Resident game species lend themselves to active management in the form of hunt management, check station information collection, and biological assessment of harvested individuals. Targeted management efforts directed at resident species focus on maintaining viable populations, rather than favoring certain species, age classes, or sexes.

- Strategy 6.1.1: Manage resident wildlife populations to achieve habitat management objectives and biological integrity with other priority species and species' groups.

GOAL 7 -- (PUBLIC USE)

Enhance public use of the refuge through development of an appropriate and compatible program of wildlife-dependent recreation and education/interpretation that is consistent with the National Wildlife Refuge System Improvement Act of 1997, benefiting visitors and promoting an understanding of the Lower Mississippi River Valley ecosystem.

The National Wildlife Refuge System Improvement Act of 1997 identifies six high priorities, wildlife-dependent public use activities for national wildlife refuges: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. Fundamental to the provision of these uses are viable and diverse fish and wildlife populations and the habitats upon which they depend. These priority uses, along with all other proposed uses, must be compatible with the refuge establishing purposes and the mission of the Refuge System, and will receive enhanced consideration over other general public uses.

If determined appropriate, recreation fees and concessions are tools available to assist in managing these uses. The refuge will only permit other uses when determined that they are legally mandated, provide benefits to the Service, occur due to special circumstances, or facilitate one of the priority wildlife-dependent recreational uses. See 605 FW 1, General Guidance, and 603 FW1, Appropriate Refuge Uses.

Objective 7.1: Manage up to 11,556 acres of refuge lands to provide compatible opportunities for wildlife-dependent public use activities, including the six designated as high priority for national wildlife refuges: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

- Strategy 7.1.1: Provide appropriate and compatible fishing opportunities at Hatchie Refuge, consistent with sound biological principles, by maintaining existing access and facilities, and by evaluating refuge resources for possible additional fishing opportunities.
- Strategy 7.1.2: Provide appropriate and compatible hunting opportunities at Hatchie Refuge by maintaining existing access and facilities and by evaluating refuge resources for possible additional hunting opportunities and access.

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- Strategy 7.1.3: Provide quality, appropriate and compatible wildlife observation and photography opportunities at Hatchie Refuge by maintaining existing access and facilities and by evaluating refuge resources for additional opportunities and facilities.
 - Strategy 7.1.4: Provide quality, appropriate and compatible environmental education and interpretation programs at Hatchie Refuge by maintaining existing programs and facilities and by evaluating opportunities for additional programs and resources.
 - Strategy 7.1.5: Develop an effective program of public outreach and awareness that provides an understanding and appreciation of the refuge and the Lower Mississippi River Ecosystem, the refuge's ecology, and the human influence on ecosystems of west Tennessee.
 - Strategy 7.1.6: Examine existing methods of orienting visitors to the refuge, and develop more effective methods and facilities to accomplish refuge information dissemination and visitor orientation.
 - Strategy 7.1.7: Evaluate and improve existing partnerships, and pursue opportunities for refuge support groups and other partnerships, including a refuge volunteer program.

GOAL 8 -- (ADMINISTRATION AND OPERATION)

Ensure that present and future operational, administrative, and personnel objectives are achieved in order that goals and objectives for refuge habitats, fish and wildlife populations, land conservation, and visitor services will be achieved.

Discussion: The administrative and operational functions associated with a refuge include a wide array of activities that are critical to the mission of the Refuge System and the purpose of each refuge. These functions include staffing, training, budgeting, planning, refuge access, law enforcement, facilities, community relations, partnering, and maintenance. Refuges must have appropriate staff, facilities, equipment, and funding in order to accomplish their overall goals and objectives.

The refuge office/visitor contact station was constructed in 2003 and is located at Oneal Lake. A shop site, including a 3-bay maintenance building with an office and storage barn, is located in the Hillville area. The shop site also contains one safety storage shed for hazardous materials, a wood shop building, above-ground gas and diesel fuel tanks, and two pole sheds for equipment storage. Two surplus campers were obtained for temporary personnel (volunteers, interns, researchers, etc.), however, only one is currently set up for use.

Objective 8.1: Provide adequate facilities, personnel, training, and equipment necessary to accomplish a comprehensive refuge management program, as proposed in this plan, by 2009.

- Strategy 8.1.1: Develop appropriate operational and maintenance facilities to ensure safe and efficient refuge operations, by 2007.
- Strategy 8.1.2: Develop staff resources, including personnel, equipment, and training, adequate to accomplish a comprehensive refuge management program, as proposed in this plan.
- Strategy 8.1.3: Maintain highly trained and effective law enforcement personnel to ensure trust resource protection, visitor safety, and enforcement of all refuge-related acts and regulations.

GOAL 9 -- (LAND PROTECTION AND CONSERVATION)

Protect natural and cultural resources through partnerships and land acquisitions and in accordance with federal and state historic preservation legislation and regulations.

To further protect natural and cultural resources on and in the vicinity of the refuge, refuge staff would seek to develop and enhance partnerships with state and county natural resource agencies, conservation organizations, and neighboring landowners, and to protect additional lands and resources. Among critical issues to be addressed are water quality, erosion and sedimentation, and cultural resource protection. With the enactment of the Antiquities Act of 1906, the Federal Government recognized the importance of cultural resources to the national identity and sought to protect archaeological sites and historic structures on those lands owned, managed, or controlled by the United States. The Service would work toward improving resource protection through offering technical advice and assistance and the identification and protection of cultural and historic resources on refuge lands.

Objective 9.1: Develop partnerships, provide technical assistance to private landowners, and protect cultural resources on neighboring lands, which have potential to significantly impact refuge natural and cultural resources.

- Strategy 9.1.1: Work with partnering conservation organizations, such as The Nature Conservancy, to protect lands adjacent to the refuge.
- Strategy 9.1.2: Work with private landowners through the Partners for Wildlife program to improve wildlife habitat and reduce sedimentation and contaminants problems that affect the refuge.
- Strategy 9.1.3: Protect cultural and historic resources from disturbance or inadvertent damage that could occur as a result of refuge activities.
- Strategy 9.1.4: By 2008, assess the feasibility of conducting a refuge-wide archaeological survey.

V. Implementation and Monitoring

BACKGROUND

To accomplish the purpose, vision, goals, and objectives contained in this plan for Hatchie Refuge, this section identifies proposed projects, including a cost summary for those proposed projects; staffing and funding needs; step down management plans; partnership opportunities; and a monitoring and evaluation plan

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

PROPOSED PROJECTS

The following proposed projects describe the basic needs that have been identified by Service staff, the public, and planning team members for the management of fish and wildlife populations, habitats, visitor services and environmental education, refuge administration and operation, and land protection and conservation on the refuge over the next 15 years.

For the purposes of achieving the goals and objectives developed for the refuge, the plan has grouped management strategies into specific projects. This plan describes 13 potential projects for development and management. Some of these projects include several different components, such as pieces of heavy construction equipment or staff positions, which would be needed to accomplish a particular project. Private lands have also been identified for potential acquisition from willing sellers or possible enrollment in conservation programs offered by the Service or other partnering agencies.

A cost summary of projects proposed for the refuge is provided in Table 1. These figures would be specifically updated and adjusted annually. There are no estimates of potential land purchases, because land values are subject to the time of the sale and market value at the time of purchase. There are no assurances that these projects will be either fully or partially funded. However, with the help and cooperation of conservation partners, the Service would use this plan to focus attention on funding the management, operation, and maintenance needs of the refuge.

The following proposed projects are categorized under four management categories: Fish and Wildlife Populations and Habitat Management, Visitor Services and Environmental Education, Refuge Administration and Operation, and Land Protection and Conservation. Each project description includes first-year costs, recurring annual costs (if any), and linkages of the proposed project to the specific goals and objectives developed during the course of the planning process.

PROJECT DESCRIPTIONS

Project Category 1: Fish and Wildlife Populations and Habitat Management

- *Project 1A - Coordinate Multi-Partner Restoration (Biologist)*. Provide a biologist to conduct needed surveys on Hatchie Refuge and easement properties, as well as coordinate activities of Hatchie Pride, a partnership of 25+ government agencies, organizations, and land owners. The 9,400-acre Hatchie Refuge, bisected by Interstate 40 and its 18 million vehicles per year, has a staff of only four people and no biologist. Important on-refuge surveys and monitoring goes undone. The progressive Hatchie Pride project focuses on restoration of the Hatchie Scenic River, which flows through the refuge and is the last unchannelized river of its type in the lower Mississippi River Valley. The river's main tributaries are channelized and are "choking" the system with 19 million tons of silt per year (a dump truck load every 13 seconds). The refuge is experiencing losses of up to 100 acres of forest per year as a result. The estimated first-year cost is \$139,000 with a recurring annual cost of \$74,000. (Linkages: Objectives 1.1, 2.1, 3.1, 4.1, 5.1, and 6.1)
- *Project 1B - Protect and Enhance Forest Resources (Forester)*. Provide a forester to initiate management on 9,400 acres of mature bottomland hardwood habitat. This threatened refuge habitat is important for a number of declining wildlife species. Losses of up to 100 acres per year of forest are now occurring due to extremely high siltation and beaver activity along the river. The forester position will lead salvage and restoration work, exploring and leading initiatives to reverse the decline. The Hatchie Scenic River is the last unchannelized river of its type in the lower Mississippi Valley, but it receives 19 million tons of silt per year (a dump truck load every 13 seconds). The forester will assist with Hatchie Pride (a partnership of more than 25 government agencies, organizations, and land owners) to help restore and maintain forested wetlands in the area. The estimated first-year cost is \$139,000 with a recurring annual cost of \$74,000. (Linkages: Objectives 1.1 and 3.1)
- *Project 1C - Restore Native Prairie Habitats*. Restore 126 acres of native prairie remnants throughout the 11,600-acre Hatchie Refuge. Restoration of this vanishing plant community will preserve a unique habitat, increasingly important as migration and wintering grounds for declining grassland songbirds, as well as nesting, feeding, and escape habitat for various native species of birds and mammals. Though many efforts are underway to restore native grasslands in the western United States, an astonishing amount of eastern prairie lands has been lost, severely impacting many groups of wildlife species that are found in increasingly small numbers on the refuge. The estimated first-year cost is \$53,000 with a recurring annual cost of \$13,000. (Linkages: Objective 3.1)
- *Project 1D - Rehabilitate New Hillville Waterfowl Impoundments*. Rehabilitate and realign 3.1 miles of levee (4 feet high) on contours to provide even, consistent flooding of waterfowl food crops. Replace 18 water control structures in this 5-field unit and reseed levees to native grasses. This 29-year-old series of interconnected, floodable fields provide food and rest areas for 20,000 ducks, as well as geese, shorebirds, other water birds, and other wildlife. The levees are steep and eroded. Water to flood these 5 impoundments is provided by the 20-acre Quail Hollow Lake via gravity flow. This project would increase the acres of habitat available for ducks as currently not all acres are floodable to optimum feeding depths. The project cost is \$437,000. (Linkages: Objectives 1.1 and 4.1)

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- *Project 1E - Replace John Deere 690 B Excavator.* Replace worn-out 21- year-old unit (2,325 hours), which breaks down often causing work delays and wasting valuable and limited staff time and scant budget dollars. Unit used for large jobs in construction and repair of waterfowl impoundments and other wildlife habitat. Unit also used extensively to repair public roads, lake dams, and boat ramps. Until it became old and worn out, this unit was borrowed extensively by other refuges for habitat improvements in Tennessee, Arkansas, Mississippi, and Alabama. The one-time cost for this project is \$213,000. (Linkages: Objectives 1.1, 3.1, 7.1, and 8.1)
 - *Project 1F - Replace 1965 Farmall 706 Farm Tractor.* Replace 39-year-old 70 hp tractor, which has broken down beyond repair. This unit was used to disk, plant, mow, and manipulate food crops for waterfowl and other wildlife. It was also used with box blade to repair roads and parking areas that were inaccessible to road grader. Currently, work of this unit has been transferred to a larger tractor, which is less efficient and requires frequent changes of implements costing valuable staff time to a small staff already overextended. Increased implement changes exposes staff to increased chance of accidents. The one-time cost for this project is \$75,000. (Linkages: Objectives 1.1, 7.1, and 8.1)
 - *Project 1G - Rehabilitate Old Hillville Waterfowl Impoundments.* Rehabilitate and realign 1.5 miles of levee on contours to provide even, consistent flooding of waterfowl food crops. Replace 7 water control structures in this 6-field unit and reseed levees to native grasses. This 33-year-old series of interconnected, floodable fields provide food and rest areas for 20,000 ducks, as well as geese, shorebirds, other water birds, and other wildlife. The levees are steep and eroded. Water to flood these 6 impoundments is provided by the 20-acre Goose Lake via gravity flow. Although the lake does not provide enough water to flood all fields, it does provide enough for one field (early August-September), which can be critical both for ducks and shorebirds. Rainfall completes the flooding in early to mid-November providing additional feeding areas as more ducks arrive. This project would increase the acres of habitat available for ducks, as currently not all acres are floodable to optimum water depths. The one-time cost for this project is \$409,000. (Linkages: Objectives 1.1 and 4.1)
 - *Project 1H - Replace 1967 Caterpillar Dozer.* Replace worn-out 34-year-old dozer with new unit of equal size. This unit is required to construct and maintain waterfowl impoundments and other habitat features for waterfowl, shorebirds, and other water birds, as well as other wildlife. Much of the work done on this refuge is subject to annual flooding, which often removes large sections of levee or road. The large blade on this machine is highly efficient in moving and shaping dirt on these larger projects thereby repairs are made in a timely and efficient way. The one-time cost of this project is \$252,000. (Linkages: Objectives 1.1 and 4.1)
 - *Project 1I - Rehabilitate Windrow Waterfowl Impoundment.* Rehabilitate 33-year-old levees, which have been eroded by floods and tunneled by beavers. Restore 1.5 miles of levee to original height and provide 4:1 slopes. Rehabilitation will provide a sound levee and encourage regular mowing. Re-seed levees to native grasses for nesting and feeding migratory birds, and provide a 6-inch gravel base on top of levee to prevent rutting when traversed in maintenance and management operations. Replace three water control structures. This waterfowl feeding area is the only one on the west side of the refuge and is needed to help distribute birds over a broader area and provide a variety of food types and sources. Over 5,000 ducks use this unit annually. This project will have a one-time cost of \$329,000. (Linkages: Objectives 1.1 and 4.1)

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- *Project 1J - Replace payloader unit.* Replace 31-year-old unit, which breaks often causing work delays and wasting valuable and limited staff hours. Hydraulic lines break frequently spraying operator with oil. Unit is necessary for maintenance of waterfowl impoundments, other wildlife habitat projects, roads, parking areas, and boat ramps. Also used in Tennessee Partners project to load pipe furnished by Ducks Unlimited for delivery to cooperating private landowners for waterfowl developments throughout west Tennessee. This project will have a one-time cost of \$199,000. (Linkages: Objective 1.1)
 - *Project 1K - Replace Water Control Structure in Little Lake Dam.* Replace rusted-out 35-year-old galvanized metal water control structure in Little Lake Dam. This unit, used to release water into a 20-acre waterfowl feeding area, is no longer functional and prevents intended use of this facility as a water storage area for this waterfowl impoundment, which typically accounts for 100,000 duck-use days per year. This dam is on the Federal Inventory of Dams, and a potential blow-out hazard does exist to the public using refuge lands below the unit. This project has a one-time cost of \$208,000. (Linkages: Objective 1.1)
 - *Project 1L - Replace 1974 John Deere 401B Mowing Tractor.* Replace 27-year-old mowing tractor currently inoperable as repair costs exceed value. New unit will be coupled with a 15-foot mower to maintain more than 70 miles of levees and roadsides and more than 100 acres of field areas and buffer strips, including native prairie restorations. This tractor/mower unit would remain together as a unit for the majority of refuge mowing operations thereby reducing accident prone coupling and uncoupling operations. Since the breakdown of the JD 401B, the larger farm tractor is used for mowing. It is much more unstable on levee slopes and requires uncoupling to do other tasks with other implements. This project has a one-time cost of \$55,000. (Linkages: Objectives 1.1, 7.1, and 8.1)
 - *Project 1M - Rehabilitate Friedman Greentree Reservoir Levee.* Rehabilitate steep and eroded Friedman levee (2,640 linear feet, 14 feet wide and average 8 feet high - the remaining 6,864 feet are 2-4 feet high protecting a 45-acre greentree reservoir, a 30-acre waterfowl impoundment and water source for Oneal Lake, and a wildlife drive for 2 million people within a 1-hour drive. Three new water control structures (48-inch) are needed, two with flap gates. This project has a one-time cost of \$213,000. (Linkages: Objectives 1.1 and 7.1)
 - *Project 1N - Replace 1979 TD-15 Dozer.* Replace worn out 25-year-old dozer. Although this unit has been the mainstay of the heavy equipment on Hatchie Refuge, it now breaks down frequently causing work delays and wasting limited and valuable staff time making repairs and most often contracting for major repairs. This unit was discontinued and parts and repairs are costly. A modern unit is badly needed to build and repair waterfowl and other wildlife impoundments, roads, and water storage reservoirs, and maintain fire breaks. This project has a one-time cost of \$261,000. (Linkages: Objectives 1.1, 3.1, 4.1, 7.1, and 8.1)
 - *Project 1O - Replace 1972 Case 680 Backhoe/Loader.* Replace 1972 Case 680 Backhoe/Loader unit. This 30-year-old unit breaks down frequently, which causes work delays thereby wasting valuable and limited staff time and scant budget dollars. Unit used for smaller jobs including installing pipes in waterfowl units (500 acres), repairing and building levees for wildlife habitat, and removing beaver dams to prevent timber loss from flooding (300 acres). Parts for this old machine are hard to find, as well as costly. This project has a one-time cost of \$88,000. (Linkages: Objectives 1.1 and 3.1)

Project Category 2: Visitor Services and Environmental Education

- *Project 2A - Expand Outreach and Public Use Opportunities (Outreach Specialist).* Provide outreach position on Hatchie Refuge to manage and expand education programs and public uses, including Project Fish, a unique partnership to design and develop fishing facilities for people with disabilities. With only four staff members on this 12,000-acre refuge, numerous outreach opportunities are lost and there is not sufficient time to develop effective exhibits, brochures, news releases, and school programs that could reach more of the two million people who live within an hour's drive of the refuge. Unique outreach initiatives (e.g., signs, AM radio station) could educate more of the 18 million vehicles passing through the center of the refuge each year on Interstate 40. An interagency venture that includes the city of Brownsville, Chamber of Commerce, Haywood County, Tourist Association of Southwest Tennessee, and The Nature Conservancy supports the Brownsville's Delta Heritage Center, which is located adjacent to the refuge. The refuge would become an active member to promote the refuge and its protections of wildlife and habitats. The estimated first-year cost is \$139,000 with a recurring annual cost of \$74,000. (Linkages: Objective 7.1)
- *Project 2B - Improve Maintenance of Resources (Maintenance Worker).* Effective maintenance of all refuge buildings, roads, and other facilities, especially the numerous public recreational and educational facilities, would be improved by this project, which provides for a second maintenance worker. "Project Fish" facilities require high maintenance standards to ensure safety for this program that targets anglers with disabilities. Proper maintenance of refuge property would significantly reduce more costly repairs and replacement of refuge facilities later, as well as ensure safe conditions for staff and the visiting public. The estimated first-year cost is \$119,000 with a recurring annual cost of \$54,000. (Linkages: Objective 7.1)
- *Project 2C - Enhance Visitor Services at Whistling Wings Wildlife Drive.* Increasing visitor use and demand require improved visitor services at Hatchie Refuge's Whistling Wings Wildlife Drive. The recently opened (and adjacent) West Tennessee Delta Heritage Center, which has one entire room dedicated to the refuge and the Lower Mississippi River watershed, is attracting new visitors to the refuge from I-40's 18 million annual vehicles. Additional informational and interpretive signs, increased educational leaflets, and increased pumping and general maintenance of portable restroom facilities are just some of the needs resulting from the increase in visitation. The estimated first-year cost is \$70,000 with a recurring annual cost of \$18,000. (Linkages: Objective 7.1)
- *Project 2D - Maintain Levees and Roadsides (Tractor Operator/Maintenance Worker).* Increasing use of Hatchie Refuge's new Project Fish disabled accessible recreational facilities, as well as expanding visitation at the Whistling Wings Wildlife Drive (drawn from the adjacent I-40's 18 million vehicles), has required extensive maintenance of roads, structures, and other facilities. The refuge's lone maintenance worker no longer has the time to effectively maintain grounds and help manage habitats due to higher priority safety needs. This project would provide for a tractor operator to better care for refuge grounds and to enable habitat improvement projects, many of which have gone undone to the detriment of wildlife and the disappointment of visitors. The estimated first-year cost is \$56,500 with a recurring annual cost of \$24,000. (Linkages: Objectives 1.1, 4.1, 7.1)
- *Project 2E - Replace 1979 Champion Road Grader.* Replace worn-out 22 year-old road grader (Hour meter broken at 325), which breaks often causing work delays and wasting valuable and limited staff hours. Unit currently maintains more than 40 miles of roads. Most

of these roads flood annually requiring extensive use of a grader each spring to prepare for 40,000 visitors. Grader did maintain roads on four refuges until recently. Unit also used to construct grader levees for temporary impoundment of water for wildlife, such as shorebird impoundments during migration periods. The cost of this project is a one-time amount of \$213,000. (Linkages: Objectives 7.1 and 8.1)

- *Project 2F - Replace 15 Hazardous Public Boat Ramps.* Replace 15 public boat ramps. The existing boat ramps, built in 1980, are highly eroded, cracked, and uneven. Replacement concrete ramps along with re-graveled associated boat ramp approaches would provide the over 20,000 annual refuge visitors with safe and solid water access for boating and fishing. The cost of this project is a one-time amount of \$88,000. (Linkages: Objective 7.1)
- *Project 2G - Replace Information and Directional Signs.* Replace 20-year-old informational, directional, and recreational signs throughout the refuge. Current signs are faded, damaged, nonstandard, and unsightly. Adequate signage is a necessity at this refuge, which is within a 60-minute drive of 2 million people. The cost of this project is a one-time amount of \$71,000. (Linkages: Objective 7.1)
- *Project 2H - Rehabilitate Big Eddy Road.* Rehabilitate this 1 mile of road, which provides access to the east side of the refuge and to a boat access ramp on the Hatchie Scenic River. It also provides management access for cooperative farming operations on a 60-acre field. This is part of 800 acres farmed cooperatively for waterfowl and other wildlife. This road is also necessary for forest management access. It provides the only refuge access to the waterfowl hunting area. Approximately 4,000 visitors use this road for hunting access and for fishing on the Hatchie Scenic River. The road was acquired around 1966 and has not since been graveled. Provide 4:1 slopes on levees to ensure soundness and encourage regular mowing and inspection for holes caused by erosion and burrowing animals. Reseed levee slopes and rights-of-way areas to native grasses to provide nesting and feeding areas for migratory birds. Provide a 12-foot roadbed with 6 inches of crusher run rock for a solid base road. The cost of this project is a one-time amount of \$121,000. (Linkages: Objectives 1.1 and 7.1)
- *Project 2I - Rehabilitate Swan Lake Road.* Rehabilitate this 1 mile of levee road by restoring height and width removed by annual flooding. Provide 4:1 slopes on levee to ensure soundness and encourage regular mowing and inspection for holes caused by erosion and burrowing animals. Reseed levee slopes to native grasses to provide nesting and feeding areas for migratory birds. Provide a 12-foot roadbed with 6 inches of crusher run rock for a solid base road. Provide 48-inch or larger culverts at all sloughs to maintain hydrology. This road, in conjunction with Windrow and Bull Pen roads, provides the only public and management access to the western interior of the refuge. It is required to access one lake and over 3,000 acres of timber land for hunting, fishing, and management. More than 13,000 visitors use this road annually. It was last graveled when it was built in 1969. The cost of this project is a one-time amount of \$292,000. (Linkages: Objectives 1.1, 3.1, and 7.1)
- *Project 2J - Replace Big Eddy Public Boat Ramp.* Replace this 18-year-old boat ramp, which is silted in beyond use except at high river stages. Located on the Hatchie Scenic River, this ramp accommodates about 4,000 anglers/wildlife observers each year. This is the only public boat ramp on the south side of the river for 35 miles upriver. It also provides the only access to the refuge's public waterfowl hunting area. The cost of this project is a one-time amount of \$98,000. (Linkages: Objective 7.1)

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- *Project 2K - Rehabilitate Little Lake Road.* Rehabilitate Little Lake Road. It was constructed in a wooded area with 30 degree slope, which causes erosion. Relocate the road 50 yards west to an open location where erosion will not be as great a problem. Disk road area, shape into roadbed with grader, and provide 6 inches of gravel to form solid roadbed. Old roadbed, which has little gravel, would be blocked with brush to prevent further erosion. This road has not been graveled in over 12 years and is used by 3,000 visitors each year. The cost of this project is a one-time amount of \$43,000. (Linkages: Objective 7.1)
 - *Project 2L - Rehabilitate Woodie-Kelso Road.* Rehabilitate this 0.5-mile of road, which has been severely eroded and damaged by flooding. Provide a 12-foot roadbed with 6 inches of crusher run rock for a solid base road. Provide 48-inch or larger culverts at all sloughs to maintain hydrology. This road is used primarily by fishermen, around 3,000 visits annually. It is also used to access timberland for hunting and timber management. This road was last graveled in 1983. The cost of this project is a one-time amount of \$156,000. (Linkages: Objective 7.1)
 - *Project 2M - Rehabilitate Bull Pen Lake Road.* Rehabilitate this 0.5-mile of road by restoring height and width removed by annual flooding. Provide 4:1 slopes at levee areas to ensure soundness, for regular mowing, and to inspect for holes caused by erosion and burrowing animals. Reseed levee slopes to native grasses to provide nesting and feeding areas for migratory birds. Provide a 12-foot roadbed with 6 inches of crusher run rock for a solid base road. Provide 48-inch or larger culverts at all sloughs to maintain hydrology. This road, in conjunction with Windrow and Swan Lake roads, provides the only public and management access to the western interior of the refuge. It is required to access one lake and over 3,000 acres of timber land for hunting, fishing, and management. Over 13,000 visitors use this road annually. It was last graveled when it was built in 1969. The cost of this project is a one-time amount of \$63,000. (Linkages: Objectives 1.1, 3.1, and 7.1)
 - *Project 2N - Rehabilitate Windrow Road.* Rehabilitate this 1-mile levee road by restoring height and width removed by annual flooding. Provide 4:1 slopes on levee to ensure soundness, for regular mowing, and to inspect for holes caused by erosion and burrowing animals. Reseed levee slopes to native grasses to provide nesting and feeding areas for migratory birds. Provide a 12-foot roadbed with 6 inches of crusher run rock for a solid base road. Provide 48-inch or larger culverts at all sloughs to maintain hydrology. This road, in conjunction with Swan and Bull Pen roads, provides the only public and management access to the western interior of the refuge. It is required to access two lakes and over 3,000 acres of timber land for hunting, fishing, and management. Over 13,000 visitors use this road annually. It was last graveled in 1984. The cost of this project is a one-time amount of \$418,000. (Linkages: Objectives 1.1, 3.1, and 7.1)

Project Category 3: Refuge Administration and Operations

- *Project 3A: Replace 4X4 Maintenance Truck.* This project calls for the replacement of the 4X4 maintenance truck, which is essential to providing support to the refuge's habitat renovation, enhancement, and management activities. This truck is used extensively off-road on remote and often rough portions of the refuge to provide maintenance and service support for heavy equipment operations. Due to the nature of use, this vehicle has experienced excessive wear and has become unreliable. The estimated first-year cost is \$25,000 with no recurring annual cost. (Linkages: Objective 1.1, 2.1, 3.1, 4.1, 5.1, 6.1, 7.1, and 8.1)

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- *Project 3B: Replace 4X4 Truck.* This project also calls for the replacement of the 4-year-old Chevrolet 4X4 truck, which is essential to providing support to the refuge's habitat renovation, enhancement, and management activities. This truck is used extensively off-road on remote and often rough portions of the refuge to provide maintenance and service support for heavy equipment operations, as well as for law enforcement operations on the refuge. Due to the nature of use, this vehicle has experienced excessive wear and has become unreliable. The estimated first-year cost is \$30,000, with no recurring annual cost. (Linkages: Objectives 1.1, 2.1, 3.1, 4.1, 5.1, 6.1, 8.1.)

Project Category 4: Land Protection and Conservation

- *Project 4A: Landscape Conservation Planning.* National, regional, and state conservation objectives for waterfowl, shorebirds, and forest-breeding birds are being stepped down to guide the formulation of objectives for the refuge focus area. Hence, there is a need to integrate science-based monitoring and inventory data with restoration and habitat management efforts on the refuge and surrounding landscape. In west Tennessee, the planning effort would cover five refuges and is being expanded to include state and private lands, which provide habitat for migratory birds. In the MAV, migratory bird habitat requirements have been developed. This information is being expanded to include areas in west Tennessee outside the MAV. Given these recommendations, it is clear that ample habitat cannot be provided on national wildlife refuges alone. Therefore, if we are to achieve the habitat goals that have been established, we must look beyond the respective refuge boundaries and incorporate into this plan any public or private lands that may be available. The primary objective of this plan is to provide a means of cooperatively protecting, restoring, and managing a sufficient amount and diversity of habitat to meet the requirements of migratory birds and resident wildlife that use west Tennessee habitats. This project calls for the comprehensive conservation planning effort to be completed by 2006. This is a complex-wide project. The total cost is \$105,000, with a recurring annual cost of \$100,000, to be shared among the refuges in the complex. (Linkages: Objectives 1.1, 2.1, 3.1, 4.1, 5.1, 6.1.)
- *Project 4B: Full-time Law Enforcement Position (1 FTE) and Law Enforcement Equipment.* The Law Enforcement Program would be improved in safety and efficiency through the purchase of equipment, including a safe, shotgun, vehicle, 3 PA-siren-director-strobe systems, and 3 mobile radios. This activity would benefit migratory birds, endangered species, and resident wildlife, and promote safer wildlife-dependent recreation. A full-time officer would be required for this activity. This is a complex-wide project. The total cost is \$129,000, with a recurring annual cost of \$65,000, to be shared among the refuges in the complex. (Linkages: Objectives 1.1, 2.1, 6.1, 7.1, 8.1.)

STAFFING AND FUNDING

Currently a staff of four permanent positions has been approved for the refuge. To complete the extensive wildlife habitat management and restoration projects and conduct the necessary inventorying, monitoring, and mapping activities, additional staff is needed. Figure 10 shows the proposed staffing plan for Hatchie Refuge and the West Tennessee National Wildlife Refuge Complex. The proposed staffing increases would enable the refuge to achieve its plan objectives and strategies within the next 15 years. The initial project costs (including salaries and benefits) would total \$ 4.4 million, with annual recurring costs of \$369,000 (Table 1). The rate at which this refuge realizes its full potential to contribute locally, regionally, and nationally to wildlife conservation and wildlife-dependent recreation and environmental education is contingent upon receiving adequate staffing and funding.

Table 1. Cost summary of proposed projects

RONS Tier 1	Initial Cost (\$K)	Recurring Base Cost (\$K)
1. Beaver Control	38	38
2. Biologist Position (1 FTE) for surveys and partner coordination	139	74
3. Visitor Services at Whistling Wings Wildlife Drive	70	18
4. Forester Position (1 FTE)	139	74
5. Native Prairie Restoration	53	13
6. Public Use Specialist Position (1 FTE)	139	74
7. Maintenance Position for Project Fish (1FTE)	119	54
8. Tractor Operator/Maintenance Position (0.5 FTE)	56.5	24
Totals	753.5	369
MMS	Cost Estimate	
1. Rehab New Hillville Impoundments	437	
2. Replace Road Grader	213	
3. Replace Excavator	213	
4. Replace 70 hp tractor	75	
5. Rehab Old Hillville Impoundments	409	
6. Replace D7 bulldozer	252	
7. Replace 15 public boat ramps	88	
8. Rehab Windrow Impoundment	329	
9. Replace wheeled loader	199	
10. Replace water control structure in Little Lake Dam	208	
11. Replace mowing tractor	55	
12. Rehab Friedman GTR Levee	263	
13. Replace Information and Direction Signs	71	
14. Rehab Big Eddy Road	121	
15. Rehab Swan Lake Road	292	
16. Rehab Oneal Lake Levee	48	
17. Replace Big Eddy Public Boat Ramp	98	
18. Rehab Little Lake Road	43	
19. Rehab Woodie-Kelso Road	156	
20. Rehab Bull Pen Lake Road	63	
21. Rehab Windrow road	418	
22. Replace TD-15 Bulldozer	261	
23. Replace Case 680 Backhoe/Loader	88	

STEP-DOWN MANAGEMENT PLANS

This comprehensive conservation plan is a broad-scale strategic plan that guides the management direction of the refuge. Before some of the strategies and projects can be implemented, detailed, program-specific management plans (e.g., step-down plans) would need to be prepared or updated.

Step-down plans describe the specific management actions the refuge intends to follow, “stepping down” from general goals, objectives, and strategies. Some step-down plans would be revised as a result of the planning process, while others would need to be developed. The preparation of step-down plans (or substantial changes to existing plans) typically requires further compliance with the National Environmental Policy Act of 1969 (NEPA), which requires the identification and evaluation of alternatives and public review and involvement prior to their implementation.

The Refuge System Manual, Part 4, Chapter 3, lists over 25 specific management plans that are potentially required on refuges. Some plans require annual revisions or programs, and others are on a 5- to 10-year revision schedule.

The following is a list of required plans and a schedule for their completion:

- Habitat Management Plan, Draft completion 2005: This plan will describe the overall desired habitat conditions needed to fulfill the refuge purpose, goals, and objectives. Procedures, techniques, and timetables for achieving desired conditions will be developed into a comprehensive plan for management of refuge habitats. (This plan incorporates components of step-down plans formerly written for: Forest Management, Moist-Soils Management, Cropland Management, and Water Management Plan.)
- Wildlife Inventory Plan (Update), Draft completion 2005: This plan will describe inventory and monitoring techniques and time frames. Numerous species including: waterfowl, songbirds, neotropical migratory birds, bald eagles, white-tailed deer, wild turkey, amphibians, and other key resident species are inventoried and population trends are monitored. These data are essential to guide the management of wildlife habitat on the refuge.
- Sport Fishing Plan (Update), Draft completion 2005: This plan will address specific aspects of the refuge’s fishing program. It will define seasons, structures, areas open to fishing, legal methods of fishing, handicapped accessibility, facilities needed, and refuge-specific regulations.
- Hunt Management Plan (Update), Draft completion 2005: This plan will address specific aspects of the refuge’s hunting program. It will define species to be hunted, season structures, areas open to hunting, legal hunting methods, all-terrain vehicle use, handicapped accessibility, facilities needed, and refuge-specific hunting regulations.
- Visitor Services and Public Use Plan (Update), Draft completion 2005: This plan will describe the refuge’s wildlife-dependent recreation, and environmental education and interpretation. Specific items or issues that will be addressed include facility needs, access, and partnerships and outreach opportunities.
- Animal Damage Control Management Plan (Update), Draft completion 2005: This plan includes a description of beaver and muskrat control methods and an explanation of the necessity to control excess populations to protect refuge habitats and the species that are dependent upon those habitats.

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- Safety/Hazcom/Pollution Prevention Plan (Update), Draft completion 2005: This plan identifies specific hazards in the workplace and defines the staff responsibilities and procedures for providing and maintaining a safe work environment. The plan also provides guidance for staff in responding to various types of emergencies and dangerous occurrences.
 - Fire Management Plan (Update), Draft completion 2005: This plan describes the use of prescribed fire on the refuge, as well as a contingency plan in the case of wildfire activity on or in the vicinity of the refuge. Safety considerations for fire fighting personnel are also addressed in this plan.
 - Law Enforcement Plan (Update), Draft completion 2006: This plan will describe the basic framework and policy for law enforcement on refuge lands, and the implementation thereof, in cooperation with other local law enforcement entities.

PARTNERSHIP OPPORTUNITIES

A major objective of this comprehensive conservation plan is to establish or enhance partnerships with local volunteers, landowners, private organizations, and state and federal natural resource agencies. At regional and state levels, partnerships already exist with organizations such as Tennessee Wildlife Resources Agency, Tennessee Department of Environment and Conservation, Natural Resources Conservation Service, Ducks Unlimited, The Nature Conservancy, University of Memphis, Bethel College, Freed-Hardemann University, and University of Tennessee at Knoxville. In the vicinity of the refuge, other opportunities exist to establish partnerships with elementary and secondary schools, private landowners, and community organizations.

The refuge volunteer program and other partnerships generated will be dependent, to a large degree, upon the number of staff positions provided to the refuge. As staff and resources are committed, opportunities to expand the volunteer program and develop new partnerships will be enhanced.

Collaboration with colleges and universities and with conservation organizations will enable the refuge to carry on its plans for research, monitoring, and education.

MONITORING AND EVALUATION

Planning is a dynamic process, and this comprehensive conservation plan and associated step-down management plans are subject to review and modification when appropriate. Monitoring and evaluation occurs at two levels. The first level, known as “implementation monitoring,” responds to the question: “Did we do what we said we would do, when we said we would do it?” Implementation monitoring will be achieved annually by refuge staff.

A second level of monitoring, referred to as “effectiveness monitoring,” responds to the question: “Were our actions effective in achieving the results we had hoped for?” This type of monitoring is more analytical in evaluating management effects on species, populations, and habitats, and would provide the basis for an adaptive management response.

Adaptive management is a flexible approach to long-term management of resources that is directed over time by the results of ongoing monitoring activities and other acquired 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 inventory, survey, and monitoring methods need to be adopted for the refuge. Habitat management strategies will be systematically evaluated to determine their effects on wildlife populations. This information is then used to refine management and determine how effectively refuge objectives are being accomplished. Evaluations will include appropriate partner participation. If monitoring and evaluation indicate undesirable effects for target or non-target species and/or communities, then alterations to the management projects will be made and the plan may be revised.

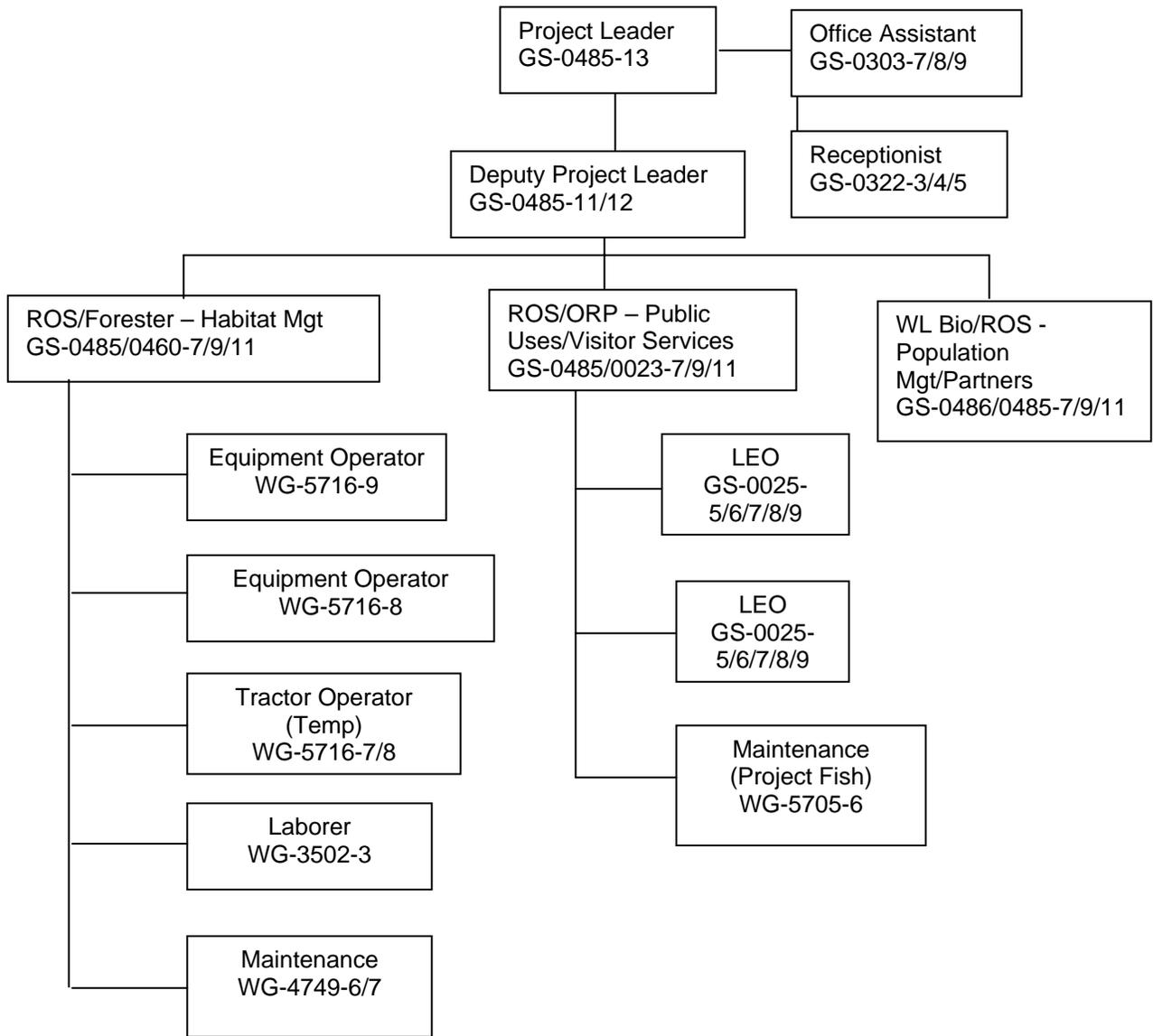
Specific monitoring and evaluation activities will be described in the step-down management plans.

PLAN REVIEW AND REVISION

This plan will be reviewed annually to determine the need for revision. It will be revised whenever significant changes occur, or pertinent information becomes available, such as a change in ecological conditions or a major refuge expansion. The plan will be supported by detailed step-down management plans, which guide on-the-ground management activities designed to accomplish specific strategies in support of the refuge's goals and objectives. Revisions to the plan and step-down management plans will comply with NEPA and will be subject to public review.

Additionally, the National Wildlife Refuge System Improvement Act of 1997 requires that plans be reviewed at least every 15 years.

Figure 7. Proposed staffing plan for Hatchie National Wildlife Refuge



Bold type indicates currently occupied positions.

SECTION B – DRAFT ENVIRONMENTAL ASSESSMENT

I. Background

INTRODUCTION

This Environmental Assessment for Hatchie National Wildlife Refuge was prepared using guidelines established under the National Environmental Policy Act of 1969. The Act requires the examination of the effects of proposed actions on the natural and human environment. In the following sections are descriptions of the proposed action, three alternatives for future refuge management, and an analysis of the environmental consequences. Each alternative was designed to provide a mix of fish and wildlife habitat prescriptions and wildlife-dependent recreational opportunities. The preferred alternative has been recommended based on its environmental consequences and ability to achieve the refuge's establishing purposes. This analysis assists the Fish and Wildlife Service in determining if it will need to prepare an Environmental Impact Statement or a Finding of No Significant Impact for the refuge.

PURPOSE AND NEED FOR ACTION

The action under consideration is the development of a Comprehensive Conservation Plan for the Hatchie National Wildlife Refuge, which will specify management direction and long-term management guidance for refuge managers. This management direction will be described in detail through a set of goals, objectives, and strategies in the plan and accompanying step-down management plans. Comprehensive conservation plans are to be revised at least every 15 years.

Management of this refuge is now guided by refuge objectives developed in 1987 and implemented by specific step-down management plans. This action is needed to address current management issues, to provide long-term management direction for the refuge, and to satisfy the legislative mandates of the National Wildlife Refuge System Improvement Act of 1997, which requires the preparation of comprehensive conservation plans for all national wildlife refuges.

The purpose for Hatchie Refuge was established by Congress through the Migratory Bird Conservation Act of 1929 (16 U.S.C. 715d) for "...use as an inviolate sanctuary or for other management purposes, for migratory birds."

The comprehensive conservation plan ultimately derived from this environmental assessment will set the management direction for the refuge for the next 15 years. As stated above, the refuge is currently guided by step-down management plans based on objectives that were developed about 15 years ago. This environmental assessment presents the preferred alternative and three management alternatives. The preferred alternative was tentatively selected based on its ability to meet identified goals through 2020. These goals may be considered as the primary need for action. Goals for the refuge were developed by the planning team and encompass all aspects of refuge management, including fish and wildlife population management, habitat management, visitor services and environmental education, refuge administration and operation, and land protection and conservation. The preferred alternative and three management alternatives were developed to achieve the following goals:

- Fish and Wildlife Populations Management: Contribute to the population goals and objectives established in regionally, nationally, and internationally significant management plans, including the North American Waterfowl Management Plan, Lower Mississippi Valley Joint Venture Plan,

Partners-in-Flight, Shorebird Management Manual, Lower Mississippi River Ecosystem Plan, West Tennessee Wildlife Resources Conservation Plan, Conservation Plan for the Hatchie River, and other plans relevant to west Tennessee and the East Gulf Coastal Plain.

- **Habitat Management:** Restore, enhance, and manage the various habitats in order to maintain the biodiversity, abundance, and ecological function of communities' characteristic of East Gulf Coastal Plain bottomland hardwoods and associated habitat types, with an emphasis on critical habitat needs for wintering waterfowl and other migratory birds.
- **Visitor Services and Environmental Education:** Develop an appropriate and compatible program of wildlife-dependent recreation and education/interpretation that is consistent with the National Wildlife Refuge System Improvement Act of 1997, and that will benefit refuge visitors while promoting an understanding of the East Gulf Coastal Plain ecosystem, the Refuge System, and partnerships required to manage habitats on a landscape scale.
- **Refuge Administration and Operation:** Develop and implement a comprehensive refuge management program to ensure that present and future operational, administrative, and personnel objectives will be achieved.
- **Land Protection and Conservation:** Provide for the protection and management of natural resources, including cultural resources, within or in close proximity to the refuge through land stewardship, technical assistance, and the development and cultivation of partnerships with local, state, and federal agencies, organizations, and individuals.

DECISION FRAMEWORK

Based on the assessment described in this document, the Fish and Wildlife Service will (1) select an alternative that best serves the purpose of the refuge and the mission of the National Wildlife Refuge System; and (2) determine if the selected alternative is a major federal action significantly affecting the quality of the environment, thus requiring preparation of an Environmental Impact Statement. The Service identified issues, concerns, and needs through discussions with the public; organizations; agency managers; conservation partners; local, state, and federal government agencies; and others. The Service's planning team identified significant issues, developed a range of alternatives, evaluated the possible consequences of implementing each of the alternatives, and recommended the preferred alternative as the best approach to guide direction of the refuge. The Draft Comprehensive Conservation Plan for Hatchie National Wildlife Refuge was developed for implementation based on this recommendation.

AUTHORITY, LEGAL COMPLIANCE, AND COMPATIBILITY

The National Wildlife Refuge System includes federal lands managed primarily to provide habitat for a diversity of fish, wildlife, and plant species. National wildlife refuges are established under many different authorities and funding sources for a variety of purposes. The purposes for this refuge were established by specific legislation and are listed in the previous section.

Additional authority delegated by Congress, federal regulations, executive orders, and several management plans guide the operation of the refuge. Appendix F of the plan contains a list of the key laws, orders, and regulations that provide a framework for the preferred alternative.

SCOPING OF THE ISSUES

The Service developed this plan ensuring public involvement in refuge management decisions. After the planning team was assembled, the Service contacted and involved a wide array of people.

The plan and process began in January 2000 when a Core Group composed of Service employees, representatives of the Tennessee Wildlife Resources Agency, and Partners-in-Flight met to discuss the scope of the planning effort and issues that would likely affect the future of the refuge. The team met several times during the year as a cooperative biological review was performed with the State of Tennessee and other partners. In November 2000, a public scoping meeting was held in which public input was received regarding issues concerning management of the refuge. A Biological Review was held in December 2002, in which Service biologists met with representatives from the state, The Nature Conservancy, Ducks Unlimited, Environmental Synergy, and the University of Memphis to discuss biological issues to be considered. Public input was also received through focus group meetings, by mailings, web-page responses, and through personal contacts.

ISSUES AND CONCERNS

An array of issues, concerns, and opportunities was addressed during the planning process. Numerous discussions among citizens, focus group participants, resource specialists, and refuge planning staff brought to light several recurring themes. In general, conservation management themes centered on: sedimentation and resulting timber losses; appropriate recreational uses; hunting and fishing opportunities, including expanded use of Oneal Lake; maintenance and development of refuge facilities; and habitat management. Alternatives were formulated and addressed the following issues raised during internal and public scoping:

- More public access for hunting, fishing, and nonconsumptive uses, including all-terrain vehicle use.
- Development of additional recreational use facilities, including boat ramps, boardwalks, trails, and viewing platforms.
- More hunting opportunities, including turkey, deer, and waterfowl.
- More fishing opportunities, including more public use of Oneal Lake.
- More nonconsumptive recreational opportunities, including environmental education and wildlife observation and photography.
- Better maintenance of facilities, including roads and trails.
- Improved water level management in regard to natural hydrology, oxbow lakes, and road culverts.
- Addressing the issue of sedimentation and its resulting impact on refuge timber.
- Use of trapping as a management tool to control damage caused by nuisance animals.

II. Description of the Proposed Action and Alternatives

The Proposed Action and three alternatives were developed by the planning team based on issues, concerns, and opportunities presented during the scoping process. Management alternatives describe desired resource conditions and visitor experiences for specific geographic areas or specific resource types, wherever they occur refuge-wide. The issues that are discussed came from individuals, cooperating agencies, conservation organizations, and refuge staff. A summary of the proposed action and three alternatives is provided in Table 2.

The proposed action and alternatives were developed to generally fit within the current refuge budget. In other words, the alternatives were formulated under the assumption that a large budget increase for refuge operations is unlikely during the life of the plan. If an alternative calls for one program to increase significantly in size or scope, then other refuge programs would need to be reduced. However, a provision was made to provide for the possibility of new private resources (e.g., volunteers and grant funds), and a modest refuge program and/or staff funding increase.

The proposed action and alternatives were developed to address most of the issues, concerns, and opportunities identified during the planning process. Specific impacts of implementing each alternative will be examined in the five broad issue categories:

- **Fish and Wildlife Populations Management:** Can we meet the target waterfowl population objectives established for Hatchie Refuge? Why are fewer waterfowl currently using the refuge than in past years? Will the proposed management alternative support the establishing purposes of the refuge? Will the proposed management scenario benefit biodiversity and protect threatened and endangered species that inhabit the refuge? How do we deal with wildlife populations, such as beaver, which negatively affect vegetation and habitat management capabilities?
- **Habitat Management:** What level of habitat restoration and maintenance is appropriate given funding constraints and desired future conditions? How can sedimentation be addressed to reduce impacts to the refuge? Will the management alternative provide the proper balance of moist soil and cropland to meet habitat needs for target waterfowl populations? Does the forest management plan provide a balanced approach from a standpoint of timber management and natural biodiversity? Does the current mix of habitat types meet the needs of all wildlife species utilizing the refuge?
- **Visitor Services and Environmental Education:** What is the appropriate level of recreational activities on refuge lands? Does the refuge adequately meet the mandate to provide quality wildlife-dependent recreation? What are appropriate non-wildlife dependent recreational activities on refuge lands? Will the quality of environmental education, both on-site and through outreach, be improved in the future?
- **Refuge Administration and Operation:** Is available funding being used effectively to accomplish refuge priorities? What other sources of income exist and what can the refuge do to acquire additional funding? What areas of the refuge are in need of additional maintenance? How can enforcement efforts on the refuge be improved within budget?

constraints? What additional staff positions would most effectively serve to advance the goals and purposes of the refuge?

- Land Protection and Conservation: What opportunities exist for new partnerships and how can existing partnerships be improved and expanded? How can the Service play a more effective role in the cooperative management of natural resources in close proximity to the refuge? What aspects of surrounding land uses threaten the integrity of ecological processes on the refuge? What can the refuge do to control or reduce negative impacts to natural resources found on or in the vicinity of the refuge? What potential exists for new or different uses or activities on new land acquisitions?

FORMULATION OF THE PROPOSED ACTION AND ALTERNATIVES

DESCRIPTION OF ALTERNATIVES

The following section describes the generalized features for each refuge management alternative. Table 2 describes the features of each alternative according to various issue categories.

ALTERNATIVE A: NO ACTION

Currently existing refuge management and public outreach practices at levels that are below acceptable Service standards would continue under this alternative. Habitat would be managed at levels allowable with existing staff, including the restoration and maintenance of bottomland hardwood forests and moist-soil habitat, and developing additional moist-soil units on suitable sites. Existing cropland habitat units would be maintained. Monitoring the conservation easement in Hardeman County would continue.

Prohibitions regarding all-terrain vehicle use, except by disabled hunters with a special use permit, on refuge lands would continue. Restrictions and limited seasons for hunting and fishing would continue, including the closure of waterfowl rest areas to public entry between November 15 and March 15.

ALTERNATIVE B: PUBLIC USE EMPHASIS

This alternative would emphasize recreational uses and environmental education while maintaining a low maintenance approach to managing habitats. Staff time and resources would be shifted to allow for more public activities in all areas of the refuge. Bottomland hardwood forests and moist-soil habitat would be maintained at existing levels, but no additional moist-soil units would be developed. Cropland acres would be planted only by cooperative farmers so that refuge staff would have time to accommodate increased public use programs.

Control of exotic plants or nuisance wildlife populations would be kept to a minimal and reactive level. Beaver control would be conducted only where necessary to protect property of adjoining landowner. However, the deer herd would be controlled through public hunting that would be expanded under this alternative. Hunting and fishing seasons and regulations would be examined to provide fewer restrictions and more opportunities, such as youth hunts, primitive weapons hunts, and additional waterfowl hunting areas.

Secondary recreational uses, such as all-terrain vehicle riding, would be considered for compatibility on existing trails and roads. The environmental education program could include the pursuit of a new visitor center, including exhibits and interpretive materials. Additional staff and/or volunteers would

be added in an effort to increase on-site public contacts, including enhanced environmental education and interpretation programs.

ALTERNATIVE C: HABITAT MANAGEMENT EMPHASIS

Alternative C emphasizes the active and intensive management of existing fish, wildlife and plant habitats. Available staff and discretionary funding would be applied to habitat enhancements such as water level manipulation and prescribed burning. Integrated biological controls and harvest methods would be used to control exotic plant or nuisance wildlife species. The biological research and monitoring program would also receive more attention.

Refuge staff would continue to restore and maintain existing bottomland hardwood forests and moist-soil units, and additional moist-soil units would be developed. Cropland habitats would be managed to maximize the availability of unharvested crops available to wildlife.

In contrast to the expanding habitat work, new recreational opportunities for visitors would not be pursued and environmental education and outreach programs would remain at the year 2002 level or below. Prohibitions regarding all-terrain vehicle use on refuge lands would continue. Hunting and fishing seasons would continue to be limited with possibly more seasonal closures to protect sensitive wildlife resources. The environmental education program would see minimal improvements in existing interpretive materials. A slight increase in public awareness of the refuge is expected due to additional signage and land protection efforts.

ALTERNATIVE D: BALANCED PUBLIC USE AND HABITAT MANAGEMENT (PROPOSED ACTION)

The Proposed Action would promote more active management alternatives of existing fish, wildlife, and plant habitats and higher quality recreational experiences for visitors. Refuge staff would continue to restore and maintain existing bottomland hardwood forests and moist-soil units, and additional moist-soil units would be developed on existing lands. Cropland habitats would be managed by cooperative and force-account (staff) farming. Integrated biological controls and harvest methods would be used to more intensively manage wildlife populations and to control exotic plant or nuisance wildlife species.

Current prohibitions on all-terrain vehicle use on refuge lands would continue. Waterfowl rest areas would continue to be closed to public entry from November 15 to March 15. The environmental education program would see moderate expansion as funding would allow. Pending available funding and opportunity, the refuge would pursue the development of a new visitor center. New public outreach strategies would result in greater public understanding and advocacy for refuge resources. Enhanced programs would provide more opportunities for quality public use, including environmental education, interpretation, wildlife observation, photography, and additional hunting opportunities, including waterfowl hunting.

Table 2. Summary of management alternatives for Hatchie National Wildlife Refuge

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Fish and Wildlife Populations Management				
Threatened and Endangered Species	Monitor and protect occasional wintering bald and golden eagles.	Same as the Proposed Action	Same as Alt. A	Monitor and protect occasional wintering bald and golden eagles. Develop interpretive materials to supplement awareness of threatened and endangered species.
Nuisance Wildlife Control	Control beaver and muskrat through minimal force account and some contract work. Minimal control of noxious plants.	Control beaver and muskrat populations to reduce loss of trust species and hardwood timber. Reactive control only. Public education of nuisance wildlife control.	Intensive beaver and muskrat control to minimize loss of trust species and hardwood timber. Mechanical and chemical control of noxious plants.	Control beaver and muskrat populations to reduce loss of trust species and hardwood timber. Mechanical and chemical control of noxious plants. Public education of nuisance wildlife control.
Neotropical Migratory Songbirds	Develop management plans/guidelines for priority species and manage habitat essential to maintain viable populations.	Increase interpretive and education efforts to minimize loss of target species and promote nongame bird conservation activities while providing public use access.	Same as Alt. A.	Develop management plans/guidelines for priority species and manage habitat essential to maintain viable populations. Increase interpretive and education efforts to promote nongame bird conservation activities.

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Migratory Waterfowl And Shorebirds	Limited enhancement as staffing and funding is available. Manage MAV populations for target levels through habitat management. Rest areas closed Nov. 15 to Mar. 15.	Add additional waterfowl hunting. Enhance public viewing opportunities.	Enhance water management capability, account farming, and monitoring to accomplish MAV population goals. Rest areas closed Nov. 15 to Mar. 15.	Enhance water management capability, co-op and force account farming, and monitoring to accomplish Mississippi Alluvial Valley population goals. Enhance public viewing opportunities. Rest areas closed Nov. 15 to Mar. 15.
Resident Wildlife	Monitor, protect, and control for healthy population levels.	Maximize compatible public access and hunting opportunities. More public education about resident species.	Increase levels of monitoring and management to accomplish optimum population goals.	Increase levels of monitoring and management to accomplish optimum population goals. More public education about resident species.
Fisheries	Manage populations at current levels.	Increased public access and fishing opportunities, including Oneal Lake. Manage for large number of fish rather than size.	Increase level of monitoring. Manage for quality-size fish rather than numbers.	Increase level of monitoring. Increase public fishing opportunities, including Oneal Lake. Manage for a combination of large fish populations and quality-size fish.

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
	Habitat Management			
Forests	Natural or artificial regeneration of selected openland. Continue controlling amount of damage due to beavers.	No active management. Develop interpretive and education programs regarding bottomland hardwood forests in the East Gulf Coastal Plain.	Increased emphasis on forest impacts due to sedimentation and beaver. Intensive management for forest interior birds. Enhance percentage of food producing species (oaks).	Natural or artificial regeneration of selected openland. Increase emphasis on forest management for forest interior birds. Develop interpretive and education programs regarding bottomland hardwood forests in the East Gulf Coastal Plain.
Dewatering Units	Manage existing and proposed units using natural and artificial flooding as staffing and funding allow.	Manage existing units at current levels and develop public access opportunities to showcase wildlife benefits of water level management.	Renovate existing units and water control structures at a faster rate than current management. Develop new units and water control structures on existing lands. Continue using natural and artificial flooding.	Renovate existing units and water control structures at a faster rate than current management. Develop new units and water control structures on existing lands. Continue using natural and artificial flooding. Develop public access opportunities to showcase wildlife benefits of water level management.
Croplands	Meet wildlife food availability mostly through cooperative farmers and a small amount of refuge force account farming.	Rely on cooperative farmers to plant refuge share and shift management emphasis to support increased public use activities.	Maximize wildlife food availability using refuge force account farming.	Increase wildlife food availability using both cooperative farming and refuge force account farming.

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Aquatic Resources	Monitor and protect at current levels. Continue to examine opportunities to reduce sedimentation and enhance natural drainage patterns through partnerships. Restore natural hydrology as funding and staffing allow.	Provide a demonstration area showing how to protect water quality (e.g., sand catchment structure) and actively market to the public.	Same as the Proposed Action.	More monitoring and protection than current levels. Continue to examine opportunities to reduce sedimentation through partner- ships. Restore natural hydrology. Provide public with information about refuge aquatic resources.
Visitor Services and Environmental Education				
Fishing	Refuge facilities would remain at less than adequate levels. Continue seasonal closures during waterfowl hunting season. Open Oneal Lake to public during special events.	Maximize fishing opportunities - allow fishing in Woodie and Kelso Lakes year-round. Open Goose Lake to boat anglers. Fix boat ramps. Benches needed at Oneal lake piers. Open Oneal Lake to public bank fishing March 15-November 15 plus other special events.	Maximize fishing opportunities by allowing fishing in Woodie and Kelso lakes year-round. Fertilize lakes, add spawning gravel, and deepen lakes. Fix Mulebarn Pond dam and McCool Lake #2 levee. Open Oneal Lake to public only during special events.	Increase monitoring of fisheries and improve existing facilities that support sport fishing access. Increase public fishing opportunities at Oneal Lake.

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Hunting	Maintain current hunting opportunities. Reduce user conflicts, e.g., no small game hunting during deer season. ATV use by hunters with disabilities only. All-terrain vehicle	Maximize hunting opportunities. Add youth hunts, muzzleloader hunts, additional waterfowl area, seasons/ bag limits same as statewide (e.g., allow small game hunting during deer season, add spring squirrel season). ATV use by hunters with disabilities only.	Limit amount of hunting to reduce amount of disturbance, (e.g., no small game hunting after November 15.) ATV use by hunters with disabilities only.	Enhance hunting opportunities while reducing user conflicts. Add additional waterfowl hunting area. ATV use by hunters with disabilities only.
Wildlife Observation and Photography	Currently less than adequate trails and no photo blinds or observation platforms. Most observation is done while driving through the refuge.	Develop self guided trails, brochures, and signs for wildlife observation and photography. Develop nature photo workshop. Add kiosks, observation platforms, and photo blind. Develop boardwalk/walkway through greentree reservoir near new office. Leave Whistling Wildlife Drive open year-round.	Facilities developed at slower rate than for public use alternative and less disturbance, especially for waterfowl. Maintain November 15-March 15 closure of waterfowl sanctuary. Close Whistling Wings Wildlife Drive November 15 – March 15, but provide spotting scope(s) on Oneal Lake piers.	Develop self guided trails, brochures, and signs for wildlife observation and photography at slower rate than for public use alternative. Maintain November 15 - March 15 closure of waterfowl sanctuary. Leave Whistling Wildlife Drive open year-round.

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Environmental Education and Interpretation	Existing visitor education facilities and environmental education opportunities at less than adequate levels. Brochures available at visitor contact station. Portable toilets available as visitor comfort station. "No hunting area" at Oneal Lake for non-consumptive users.	New visitor center with interpretive displays and brochures as funding becomes available. Increase environmental education activities, interpretive materials, facilities, and staff and provide year-round experiences. Construct visitor comfort station at Oneal Lake. Conduct "teach-the-teacher" workshops, volunteer programs, and encourage group tours.	More interpretive signs explaining management activities. More reliance on self-guiding trails and interpretive facilities.	Build new visitor education facility as funding becomes available. Enhance and improve existing visitor education facilities and environmental education opportunities. Construct visitor comfort station at Oneal Lake. "No hunting area" at Oneal Lake for non-consumptive users.

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Outreach and Awareness	Continue partnering with state, federal, and private agencies/ organizations. Develop and implement new initiatives to promote public awareness of fish and wildlife conservation and federal and state programs. Continue partnership in Hatchie River Project and Partners for Wildlife Program. Few news releases. Little marketing of the refuge.	Continue partnering with state, federal, and private agencies/ organizations. More marketing of the refuge to outlying communities. Higher number of news releases to larger media markets. More school programs. Increase participation at public events, Ducks Unlimited Expo, festivals, etc.	Continue partnering with state, federal, and private agencies/ organizations. Moderate level of news releases regarding habitat management, bottomland hardwood ecosystem functions, and Hatchie River influences on the refuge.	Continue partnering with state, federal, and private agencies/ organizations. Develop and implement new initiatives to promote public awareness of fish and wildlife conservation and federal and state programs. Continue partnership in Hatchie River Project and Partners for Wildlife Program.
Refuge Administration and Operation				
Maintenance	Maintain current level of facilities maintenance, based on budget limitations.	Increase maintenance efforts for public use facilities while reducing maintenance efforts for habitat management facilities.	Increase maintenance efforts for habitat management facilities while reducing maintenance efforts for public use facilities.	Increase budget and staffing for maintenance of public use and habitat management facilities.
Law Enforcement	Maintain current inadequate staff levels to support existing refuge programs.	Law enforcement efforts to emphasize public safety.	Law enforcement efforts to emphasize resource protection.	Increase law enforcement efforts for public safety and resource protection.

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Staff	Current full-time staff of 5 FTEs is inadequate to meet public use and habitat management needs.	Increase staff to facilitate larger public use program. Add Public Use/Park Ranger position.	Increase staff for habitat management programs while reducing staff for public use programs. Add forester/wildlife biologist.	Increase staff as needed to facilitate larger public use and habitat management programs. Full staffing at 9.5 FTEs.
Operations	Maintain current operations capability to support existing refuge programs.	Increase operations capabilities for public use programs while reducing capabilities for habitat management programs.	Increase operations capabilities for habitat management programs while reducing capabilities for public use programs.	Explore possibilities for increased operations capability for both public use and habitat management programs.
Land Protection and Conservation				
Technical Assistance	Provide current minimal level of technical assistance to landowners, agencies, and individuals. Add private lands biologist.	Decrease emphasis on lands outside refuge as more emphasis is placed on public use of refuge lands.	Same as the Proposed Action.	Explore new techniques and programs for assisting landowners and partners. Add Private Lands Biologist.
Resource Protection	Provide current levels of awareness and protection to cultural and natural resources.	Focus on public awareness, protection of cultural and natural resources on existing refuge lands. More efforts directed towards public education for resource protection and public use rather than habitat management.	As public use is reduced, provide greater protection for cultural and natural resources on existing lands.	Increase levels of public awareness and protection of cultural and natural resources on existing lands.

III. Affected Environment

Hatchie National Wildlife Refuge was established in 1964 by the Migratory Bird Conservation Commission, with the first land acquired and the first manager assigned in 1965. Duck stamp funds were used to purchase all of the current holdings except for the 335-acre Porter Tract, which was purchased in 1977 with receipts from a timber sale. The establishing purpose for the refuge was "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715 d (Migratory Bird Conservation Act). The refuge currently encompasses 11,556 acres.

Hatchie Refuge is located approximately 4 miles south of Brownsville, Tennessee, in Haywood County, with the northern boundary lying adjacent to 24.5 miles of the Hatchie River. The Hatchie River is designated as a Class 1 Scenic River under the Tennessee Wild and Scenic Rivers Act and is one of the last major unaltered streams in the entire lower Mississippi River Valley. State Highway 76 and Interstate Highway 40 bisect the refuge, which lies 55 miles northeast of Memphis, Tennessee, and 30 miles west of Jackson, Tennessee. More than 2 million people live within 60 miles of the refuge.

The dominant habitat type is seasonally flooded bottomland hardwood forest, with approximately 9,764 acres found on the refuge. Despite the high grade logging of 4,500 acres in the 1970s due to a condemnation proceeding, the refuge's bottomland hardwood forest remains an excellent example of this habitat type in the National Wildlife Refuge System. Due to flooding from the Hatchie River, the refuge's forested wetlands function under nearly natural wetland cycles. They provide a prime example of the oak dominated forests of the upper delta that were historically the primary wintering habitat for continental mallard populations. A major impact to the forest is occurring as a result of massive deposition of sediment from tributaries of the Hatchie River. This ongoing sedimentation problem is producing long-term detrimental impacts to the refuge forests.

Other habitats include 382 acres of upland forest, 296 acres of open water found in 10 oxbow lakes, 5 borrow pit ponds, 4 water storage reservoirs, and natural sloughs, creeks, and swamps with 110 acres of scrub/shrub. Approximately 972 acres of upland and lowland agricultural areas are managed as combination cropland, moist-soil, and old field habitats.

The refuge is inhabited by approximately 53 species of mammals, including white-tailed deer, coyote, beaver, mink, muskrat, and raccoon. Several popular game fish species are found in lakes and tributaries on or adjacent to the refuge, including largemouth bass, bluegill, black and white crappie, and channel catfish. Approximately 75 species of reptiles and amphibians are known to inhabit the refuge lands and waters.

The refuge possesses a diversity of habitat suitable for numerous different avian species, with over 200 species of nongame migratory birds known to utilize habitats in the vicinity of the refuge. The refuge is utilized by a host of raptors including red-tailed hawks and barred owls. Shorebirds find suitable habitat for feeding and resting during spring and fall migrations, with water levels managed within both agricultural and moist-soil areas providing excellent shorebird habitat. The refuge also provides diverse forest habitats suitable for many species of neotropical migratory songbirds.

The refuge serves as an important wintering ground for thousands of migratory waterfowl. Backwater flooding from the Hatchie River typically floods thousands of acres of bottomland hardwoods during winter and spring months, which provide valuable waterfowl habitat. In addition, water control structures flood about 295 acres of moist soil/cropland, providing additional waterfowl habitat. Up to

30,000 waterfowl congregate in the refuge vicinity during winter months. Additional detail on the refuge is included in Chapter III of the Draft Comprehensive Conservation Plan.

THREATENED AND ENDANGERED SPECIES

Only one federally listed species known to use the refuge vicinity during at least part of its life cycle is the American bald eagle.

The American bald eagle (*Haliaeetus leucocephalus*) is a threatened species that the Service plans to remove from the Endangered Species list. Usually 3-4 bald eagles winter annually on the refuge, but no nests have been observed on the refuge.

CULTURAL RESOURCES

Archaeological surveys on the refuge are limited, although numerous investigations have been conducted within nearby portions of west Tennessee. Significant surveys performed in west Tennessee include Mainfort (1994) in which archaeological investigations were made within the Obion River drainage, and Dickson and Campbell (1979), which surveyed cultural resources on Reelfoot and Lake Isom refuges. These west Tennessee reports document an area rich in prehistoric and historic cultural resources, dating back as far as 12,000 B.C. Numerous other smaller archaeological resource studies have been conducted in west Tennessee in conjunction with various federal development projects.

Archaeological investigations on Hatchie Refuge lands consist of a survey of the refuge in 1979 by Gerald P. Smith of Memphis State University. Five sites were recommended for further investigation to determine their eligibility for inclusion on the National Register of Historic Places. It is likely that numerous other undisturbed sites exist on the refuge and that the number of reported sites is probably a small fraction of the total number of sites actually present on refuge lands. Levee and road construction, as well as agricultural activities, have undoubtedly adversely impacted archaeological deposits associated with many sites on the refuge. In the event that additional construction or excavation plans are made for refuge lands, additional cultural resource investigations should be performed prior to construction activities. More detail on the affected environment of the refuge is included in Chapter III of the Draft Comprehensive Conservation Plan.

IV. Environmental Impacts

EFFECTS COMMON TO ALL ALTERNATIVES

Specific environmental and social impacts of implementing each alternative are examined further in the five broad issue categories: fish and wildlife population management, habitat management, visitor services and environmental education, refuge administration and operation, and land protection and conservation. However, a few potential effects will be the same under each alternative and are summarized below:

FISH, WILDLIFE, AND HABITAT

Each alternative would protect habitat types important to migratory birds, mammals, reptiles, amphibians, fish, and invertebrates, including threatened and endangered species. American bald eagles are known to winter on the refuge, although no active nests have been observed. Each alternative would ensure ongoing protection of American bald eagles from disturbance. Implementation of all alternatives would benefit and not likely adversely affect threatened or endangered species or habitats.

The deer population on the refuge is currently at carrying capacity. Under all alternatives, forest and cropland management actions would result in protection and habitat benefits for refuge deer populations. Each alternative includes deer population control through a hunt program.

Each alternative provides additional protection to wetlands beyond the protection afforded by existing wetland regulations. Riparian areas would be protected and provide travel corridors between the refuge and private lands adjacent to the refuge. Subject to landowner control, wildlife corridors could be restored by private landowners willing to enroll their lands in private lands conservation programs.

Economic benefits would result from increased visitation to the refuge and would directly improve the value of goods and services to local communities, such as Brownsville. Under each alternative, refuge visitation for priority public uses would be expected to build over time as lands are acquired and operation funds are provided. The number of visitors would depend on the season and would grow as the land base increased and more public use programs were provided.

The Refuge Revenue Sharing Act requires the Fish and Wildlife Service to make payments to local taxing authorities to offset the loss in tax revenue when land is purchased for a refuge.

Recent trends demonstrate a decline in federal farm subsidies for crop production (USDA Economic Research Service 2000). Crop prices nationwide have declined as well. As a result, real estate trends demonstrate a marked increase in farm land sales. There is a positive benefit (including tax relief to heirs) for farmers in the nearby Lower Mississippi Valley to restore natural habitat conditions of marginal farm lands and forest lands located in flood prone areas for wildlife, and to enroll properties in conservation easements.

AIR AND WATER QUALITY

Habitat management involving prescribed burning may occur only within prescribed parameters to minimize the effects to air quality. Smoke management practices would be implemented during all burning events.

Each alternative would positively impact soil formation processes on lands the refuge acquires. Some disturbances to surface soils and topography would occur at those locations selected for administrative, maintenance, and visitor facilities, as well as in areas targeted for forest management practices. Each alternative would protect the natural hydrology of the affected areas. Each alternative would prevent substantial agricultural acreage from being developed if the Service acquired properties or provided assistance to landowners and local conservation partners. Each alternative would maintain groundwater recharge areas and natural catchments to hold and absorb surface waters, thereby minimizing flooding. Refuge management activities and visitor use should not negatively affect water quality. All alternatives would positively impact water quality in individual streams. Other positive impacts include runoff prevention, sediment retention, and minimizing non-point source pollution. Land acquisition in erosion-prone areas has the potential to improve water quality in the immediate vicinity of the refuge.

CULTURAL RESOURCES

The Fish and Wildlife Service is responsible for managing archaeological and historic sites found on federal lands under its jurisdiction. Each alternative affords land protection and low levels of development, thereby producing little negative effect on the cultural and historic environment. Potentially negative impacts could include logging and the construction of new trails, roads, or facilities. In most cases, these management actions would require review by the Regional Archaeologist and consultation with the Tennessee Historic Preservation Office, as mandated by Section 106 of the National Historic Preservation Act. Cultural resource surveys on the refuge have been limited and indicate that other cultural sites likely exist. Determining whether a particular action within an alternative has the potential to affect cultural or archaeological resources is an ongoing process that would occur with the planning stages of every project. Service policy is to preserve these resources in the public trust, avoiding impact whenever possible.

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, or activities on minority or 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 participation in matters relating to human health or the environment.

None of the alternatives would disproportionately place any adverse environmental, economic, social, or health impacts on minority or low-income populations. Implementation of any action that includes public use and environmental education would provide a benefit to citizens living in the vicinity of the refuge.

CLIMATE CHANGE IMPACTS

The Department of the Interior issued an order in January 2001 requiring federal agencies under its direction, that have land management responsibilities, to consider potential climate change 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 temperature commonly referred to as global warming. In relation to comprehensive conservation planning for national wildlife refuges, carbon sequestration constitutes the primary climate-related impact to be considered in planning. The Department of Energy's "Carbon Sequestration Research and Development" (U.S. DOE 1999) defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

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

Preserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in the comprehensive conservation plan would preserve 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.

CUMULATIVE EFFECTS

No significant cumulative impacts on the environment are anticipated. Management of the refuge under the preferred alternative would provide protection to native bottomland hardwood forests, and would provide the conditions necessary to support increases in forest breeding birds and the protection and recovery of threatened and endangered species.

The forest wetland environment is heavily influenced by agriculture and water development activities, resulting in diminished quality of the water, soils, and air. These actions are cumulative and occur throughout the Lower Mississippi Valley. Pollution sources in the Lower Mississippi Valley include animal waste, agricultural chemicals, construction, logging, hazardous material spills, sand and gravel extractions, junk yards, landfills, litter, and debris. These pollution sources are generated by human populations and are cumulative over time. Threats to the refuge's fish and wildlife resources would primarily be from outside its boundaries through increased habitat fragmentation, nutrient loading, and erosion.

UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects are projected based on changes in levels of management activities described in the Service's proposed action. The effects on the quality of the human environment are not likely to be highly controversial or involve highly uncertain, unique, or unknown environmental risks to the human environment. None of the alternatives would lead to a violation of federal, state, or local laws imposed for the protection of the environment.

Some forest management practices, construction of visitor facilities, and increased visitation may affect local air and water quality, natural vegetation, and soil compaction. Increased visitation would also mean additional disturbances to both resident and migratory wildlife. Additional hunting could result in increased conflicts, with some user groups opposing such activity. Wildlife harvests through hunting and trapping would reduce the number of certain species, enabling other species of management concern to increase or recover. Such management actions are necessary in order for the Service to carry out its wildlife resource protection mandates. Although some unavoidable adverse impacts are expected, such as noise and disturbance from human activities, the benefits to wildlife and habitats outweigh these impacts.

The development potential of the protected land would be precluded, which could cause the local economy to be adversely impacted. Also, local government would not receive the fiscal benefits of increased property tax receipts. However, this type of impact is expected to be minor. The Service is committed to working only with willing sellers. People would not be willing to forego rewards from future development potential if the value of the property, adjusted to account for risk and inflation, is greater than the value they receive by forfeiting their development rights. Therefore, it can be assumed that property owners who give up their development rights do not expect the development potential of their lands to increase greatly, or are simply more interested in land conservation than any monetary gains. Further, the Service makes refuge revenue sharing payments in lieu of taxes to the county.

SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Short- and long-term effects describe the relationship between short-term uses of the human environment and maintenance of long-term productivity of the environment.

In the long term, land protection would reduce municipal service costs, while providing increased quality of life, essential habitat for wildlife, and outdoor recreation. Any loss in taxes would be at least partially offset by the annual refuge revenue sharing payments.

In the long term, local economy would be positively impacted by spending on environmental programs. The programs would attract visitors and impact tourism and recreation in the region. Adverse impacts would be mitigated or offset by the positive impacts from open space and quality habitat for plants and animals.

All long-term impacts on biological resources are expected to be beneficial. Sites attracting threatened and endangered species would receive the highest priority for protection. Important stopover, feeding, and breeding habitat for migratory birds would be targeted for protection and management. Aquatic species, wide-ranging species, and species which require active management would benefit from habitat improvements, restoration and land protection actions outlined in the comprehensive conservation plan. Technical assistance, environmental education, Partners-in-Flight grants, and Challenge Cost-Share Program grants would enhance area-sensitive species on dedicated open space, privately owned lands, and refuge lands.

The development of visitor facilities, trails, observation platforms, hunter check stations, wetland restoration projects, and forest management practices would result in both short-term and long-term physical impacts on soil and vegetation. These impacts would be localized and confined to the immediate area of the development/construction sites. Increased attention to environmental education and recreation programs may result in more audiences being involved in environmental education and recreation and may provide for a greater appreciation of the land.

Long-term beneficial effects include the increased productivity of threatened and endangered species, songbirds, waterfowl, shorebirds, white-tailed deer, small game and a myriad of others species dependent on refuge habitat. The public would also gain long-term opportunities for recreation and education on some refuge tracts.

Short-term use of refuge lands includes forest regeneration and prescribed restoration improvements, wetlands enhancement, invasive exotic plant control, management for selected species, wildlife inventories, water quality monitoring, and the administration of education and visitor use programs and facilities. These activities would be implemented with a primary goal of assuring the sustained productivity of refuge resources.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are those which cannot be reversed and results when an area cannot be returned to its natural condition for an extended period of time. For example, the depletion of old growth forests is irreversible. Irretrievable commitments of resources occur when a renewable resource is allocated to a given use and cannot be recovered without significant effort.

Federal ownership may affect surrounding land-use patterns, local economies, and county tax revenues. Property located adjacent to refuge lands generally increases in value, landscapes become protected, revenues to local service businesses increase, and costs to local counties for services decrease.

Management of the refuge and lands acquired would result in an irreversible and irretrievable commitment of funding for operations, administration, and management. Funding and personnel commitments by the Service to purchase and manage refuge lands and facilities render those resources unavailable for other Service programs and projects. The more public use activities and facilities provided, the greater the operating and maintenance costs involved.

Any wetland restoration project would be considered irreversible. Following restoration, the Clean Water Act would make it very difficult to reconvert wetlands on a national wildlife refuge to a drained condition. Irreversible loss of habitat, as part of the Service's proposed action, would occur at construction sites of new facilities.

Animal and plant populations are renewable in different degrees. Construction sites and some habitat management practices may irretrievably damage natural communities, at least for a period of time. These activities would be managed in such a way that the health and viability of wildlife populations would not be threatened.

SUMMARY OF ENVIRONMENTAL IMPACTS

The following section describes the environmental impacts of each alternative. Table 2 addresses the likely outcomes for specific issues and is organized by broad issue categories.

ALTERNATIVE A: NO ACTION

Existing refuge management and public outreach practices would be favored under this alternative. Continued maintenance and enhancement of bottomland hardwood forests and moist-soil habitats would occur, and development of additional moist-soil units would provide additional waterfowl habitat. Maintenance of existing cropland habitats would continue to provide an important wildlife food source. Ongoing monitoring efforts would include habitat quality and wildlife distribution and population levels.

Hunting and fishing seasons and regulations, including prohibitions on all-terrain vehicle use and seasonal closures, would be used to limit disturbance for waterfowl and other wildlife species. Improvements in interpretive materials would be used to inform and educate visitors about fish and wildlife management issues.

Chapter IV of the Draft Comprehensive Conservation Plan contains more details about the current management of the refuge.

ALTERNATIVE B: PUBLIC USE EMPHASIS

This alternative would emphasize recreational uses and environmental education while maintaining a low maintenance approach to managing habitats. Public use opportunities would increase as staff time and resources are shifted to emphasize public use programs. An enhanced environmental education program could provide facilities and programs for more quality environmental education and interpretation opportunities to accommodate refuge visitors. Changes in current management would include reductions in seasonal closures, as well as enhancing hunting and fishing opportunities and access while not compromising protection of wildlife resources.

Bottomland hardwood forests and moist-soil habitats would be less intensively managed as staff and resources are shifted to public use programs. Law enforcement and monitoring of visitor activities would be increased. The development of no new moist-soil units would limit potential additional waterfowl habitat. Reduction in cropland acres would result in less wildlife food production and could potentially limit the refuge's abilities to attract and hold target waterfowl populations during winter months.

Reactive control only of beaver populations may result in increased populations and potential damage to bottomland hardwood forests and waterfowl habitats. More liberal hunting and fishing seasons and regulations, and possible all-terrain vehicle use, would produce added public use opportunities, but could also negatively affect waterfowl populations and other trust species. Other possible impacts, which could occur under this alternative, would be the alteration of habitats, including drainage and/or destruction of existing habitats as less habitat management is performed.

ALTERNATIVE C: HABITAT MANAGEMENT EMPHASIS

Alternative C emphasizes the active and intensive management of existing fish, wildlife, and plant habitats. Habitat enhancement, such as tree plantings and prescribed burning, would enhance habitat quality and benefit wildlife populations. Proactive control of nuisance wildlife species and the integration of biological controls and harvest methods would ensure more effective and balanced management of wildlife populations and habitat. An increased biological research and monitoring program would enhance understanding of refuge resources and benefit future management efforts.

Continued maintenance of bottomland hardwood forests and moist-soil units, and development of additional moist-soil units, would provide additional waterfowl habitat. Additional cropland farming units and more intensive management by force account farming would significantly increase the refuge's capability to attract and hold target waterfowl populations during winter months. Land acquisitions, when possible, would increase the capability of the refuge to protect resources.

Public use opportunities would decrease as new recreational opportunities for visitors would not be pursued, and environmental education and outreach programs would remain at the year 2002 level or below. Continued prohibition on all-terrain vehicle use, along with possible additional restrictions in seasonal access for hunting and fishing, could reduce consumptive public use opportunities. Only minor improvements would occur in existing public use exhibits and interpretive materials. A slight increase in public awareness of the refuge would be expected due to land protection efforts.

ALTERNATIVE D: BALANCED PUBLIC USE AND HABITAT MANAGEMENT (PROPOSED ACTION)

The Proposed Action would promote more active management of existing fish, wildlife, and plant habitats, as well as provide higher quality recreational experiences for visitors. Continued maintenance of bottomland hardwood forests and moist-soil units, along with development of additional moist-soil units would provide more waterfowl habitat. Additional cropland farming units

and more intensive management by staff farming would significantly increase the refuge's capability to attract and hold target waterfowl populations during winter months. Monitoring efforts for habitat quality and wildlife distribution and population levels would be enhanced.

Hunting and fishing seasons and regulations, including prohibitions on all-terrain vehicle use, as well as seasonal closures would be used to limit disturbance to waterfowl and other wildlife species. Improvements to interpretive materials would be used to inform and educate visitors about fish and wildlife management issues, refuge purposes and vision, and the Service mission. Public outreach strategies would be examined to provide greater public understanding and advocacy for refuge resources. Enhanced public use programs and facilities would provide more opportunities for high quality public use, including environmental education, interpretation, wildlife observation, and wildlife photography.

COMPARISON OF THE PROPOSED ACTION AND ALTERNATIVES

FISH, WILDLIFE, AND HABITAT

Alternative B would provide the least amount of habitat protection and management emphasis, while the preferred alternative and Alternative C would provide the most protection and management.

Under Alternative B, waterfowl and shorebirds could be negatively impacted by less protection and increased public access. Overall foraging habitat for waterfowl and shorebirds should improve under the preferred alternative and Alternatives A and C, because of improvements to moist-soil and croplands habitats. Forest management activities in the preferred alternative and Alternatives A and C would result in long-term benefits that would improve nesting habitat for neotropical migratory birds.

Alternative B would provide slightly less protection to bald eagles due to increased public use activities, while Alternative C would provide increased protection as a result of less public use.

Increased access and public use under Alternative B could impact deer movement and population levels as more hunting opportunities are provided.

Hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation would increase under the preferred alternative and Alternatives A and B as more opportunities and facilities are provided, or as additional lands are acquired. Alternative C could result in a reduction of certain nonconsumptive activities from current levels. Hunting opportunities would increase under the preferred alternative and Alternative B. Alternative A would result in hunting at current levels, and Alternative C would result in reduced hunting opportunities.

The levels of wildlife-dependent recreation allowed in the preferred alternative and Alternatives A and B would support an increase in economic activity. Economic benefits would result from increased visitation to the refuge and would directly improve the value of goods and services to local communities, such as Brownsville.

Table 3. Summary of environmental impacts for management alternatives for Hatchie National Wildlife Refuge

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Fish and Wildlife Populations Management				
Threatened and Endangered Species	Same as the Proposed Action.	Possible increased disturbance of wintering bald eagles.	Same as the Proposed Action.	Stable. Possible occasional disturbance of wintering bald eagles.
Nuisance Wildlife Control	Same as the Proposed Action.	Stable to increased beaver populations due to reactive control only.	Same as the Proposed Action.	Stable to decreased beaver populations due to proactive control.
Neotropical Migratory Songbirds	Stable but with increasing understanding as result of ongoing monitoring and study.	Greater public awareness but possible increased disturbance due to increased public access.	Same as Alternative A.	Stable or increasing and with increasing understanding as result of ongoing monitoring and study. Increased public awareness.
Migratory Waterfowl And Shorebirds	Stable through limited access, maximum protection, and habitat management programs.	Increased public access resulting in increased disturbance could have impacts upon population levels and distribution patterns.	Population increases due to enhanced habitat management.	Population increases due to enhanced habitat management. Increases in public viewing visitations will increase disturbance.

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Resident Wildlife	Stable with monitoring, protection and control.	Possible increased disturbance, due to increased public use, including possible impacts on wildlife behavior, distribution, and abundance.	Same as the Proposed Action.	Stable to increased populations through increased monitoring and intensive management.
Fisheries	Stable through current monitoring and protection.	Possible increased disturbance due to increased public access.	Positive impacts through increased monitoring and protection.	Positive impacts through increased monitoring. More public use opportunities.
Habitat Management				
Forests	Benefits to forest resources through sound silvicultural practices, including planting and natural regeneration on selected openlands.	Reduction in benefits as result of no active management. Possible increased disturbance through increased public access. Increased public awareness.	Increases in forest size, structure and connectivity through sound silvicultural practices, including planting and natural regeneration on selected and newly acquired openlands.	Increases in forest size, structure, and connectivity through sound silvicultural practices, including planting and natural regeneration on selected and newly acquired openlands. Increased public awareness.

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Moist-Soil Units	Beneficial impacts through intensive management.	Stable impacts with management of existing units and no additional units developed. Increased public awareness.	Beneficial impacts through intensive management and additional units developed on existing and newly acquired lands.	Beneficial impacts through intensive management and additional units developed on existing and newly acquired lands. Increased public awareness.
Croplands	Stable impacts due to ongoing management and maintenance of existing units.	Reduction in wildlife benefits due to reduction in cropland management. Increased public awareness.	Beneficial impacts due to development of additional units and more intensive management, including force account farming.	Beneficial impacts due to development of additional units and more intensive management, including force account farming. Increased public awareness.
Aquatic Resources	Stable impacts with monitoring and protection. Possible improvements to natural drainage.	Increased public awareness.	Same as Alternative A.	Stable impacts with monitoring and protection. Possible improvements to natural drainage. Increased public awareness.
Visitor Services and Environmental Education				
Fishing	Stable impacts under current management.	Same as the Proposed Action.	Positive benefits from increased monitoring. Reduction in fishing opportunities due to seasonal closures.	More opportunities through improved access and facilities. Increased numbers of anglers requiring additional enforcement efforts.

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Hunting	Stable level of opportunities according to limited seasons/units.	Increased opportunities with longer seasons and reduced closures.	Positive benefits from more intensive management. Possible reduction in opportunities due to additional seasonal closures.	Increased quality of hunting with more intensive management. Possible increased opportunities.
Wildlife Observation and Photography	Maintain current programs, facilities, and opportunities.	Same as the Proposed Action.	Possibly less opportunities through increased seasonal closures.	Significant increase in opportunities through more trails, facilities, and access.
Environmental Education and Interpretation	Maintain current programs and opportunities.	Significant increase in opportunities through facilities, staff, access, and new visitor facility.	Slight increase in opportunities with new visitor facility. Overall, reduced emphasis on program and more seasonal closures.	Increase in opportunities through expanded programs, facilities, and possible new visitor facility.
Outreach and Awareness	Maintain current levels of partnering and information sharing	Same as the Proposed Action.	Stable level of public information sharing, in keeping with optimum resource management goals.	Increased levels through new partnering and information sharing efforts.

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Refuge Administration and Operation				
Maintenance	Current maintenance levels are below acceptable levels.	Increased maintenance of public use facilities, maintenance of habitat management facilities decreases. Budget needs stable.	Maintenance of habitat management facilities increases with some reduction of maintenance of public use facilities. Possible slight increase in budget needs.	Maintenance of both public use facilities and habitat management facilities increases. Budget needs increase.
Law Enforcement (LE)	Current levels of LE are inadequate to meet public use and resource protection needs.	Same as the Proposed Action.	LE needs shift from less public use activities (patrol) to more natural resource protection work.	Increased LE needed due to increased public use.
Staff	Stable budgets erode management capabilities due to inflation.	Staff emphasis shifted from habitat management to public use. Possible staff increase needed for increased public use programs.	Shift staff emphasis from public use to habitat management. Possible staff increase needed due to additional land acquisitions.	Staff increases needed for both public use and habitat management programs.

Issues	Alternative A No Action (Current Mgmt. – 2004)	Alternative B Public Use Emphasis	Alternative C Habitat Management Emphasis	Alternative D Balanced Public Use and Habitat Management (Proposed Action)
Operations	Current levels of operation maintained. Budget needs presently exist.	Operations emphasis shifted from habitat management to public use programs. Increase in operational budget needs.	Operations emphasis shifts from public use to habitat management programs. Increase in operational budget needs.	Operations needs for both public use and habitat management operations increases. Budget needs increase.
Technical Assistance	Beneficial impacts to lands outside refuge as programs are increased. Negative impact as current inadequate level of technical assistance is provided to landowners, agencies, and individuals.	Program emphasis decreased. Lands outside Refuge negatively impacted due to less protection of soil and water, less revegetation.	Same as the Proposed Action.	Beneficial impacts to lands outside Refuges as program is increased. Positive impacts to soil, water, and revegetation of cleared lands.
Resource Protection	Protection of natural and cultural resources is maintained at current (adequate) levels on refuges and adjacent lands.	Increased public awareness of cultural and natural resources. Some reduction in protection of natural resources due to increased public use. refuge	Greater level of protection for cultural and natural resources on existing lands. Reduced public awareness.	Protection of natural and cultural resources is maintained at greater level on refuge and adjacent land. Increased public awareness.

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VI. Consultation and Coordination with the Public and Others

The Hatchie National Wildlife Refuge Draft Comprehensive Conservation Plan and Environmental Assessment have been written with the participation of Service staff, refuge users, environmental resource professionals, and the local community. The planning process began in January 2000 when a core group was formed to begin the biological planning for an interagency effort in west Tennessee, which incorporated approximately 10,000 square miles of private, state, and federal lands. This effort eventually produced the West Tennessee Wildlife Resources Conservation Plan, which served as the biological foundation for four west Tennessee refuge comprehensive conservation plans, including this plan. Later that same year, a planning team was formed for the Hatchie Refuge plan, and in November a public scoping meeting was held in Brownsville, Tennessee. Comments were received during the meeting, as well as by mail, email, and telephone, regarding perceived issues and opportunities on the refuge. Presentations were given to west Tennessee rotary clubs. A mailing list was developed, which kept interested parties informed as to the progress of the planning effort. A planning review group, composed of professionals and other individuals with specific knowledge or interest in the refuge, met periodically to review and discuss refuge issues and to provide comments on the planning as it progressed. This group was composed of state and federal agency professionals, non-governmental organizations, private businessmen, sportsmen, and local officials. Recommendations from these working groups provided valuable information for the authors of this plan. Please see Chapter II of the draft plan for more information on the public scoping/involvement process.

SECTION C. APPENDICES

Appendix I: Glossary

Adaptive Management - A process in which projects are implemented within a framework of scientifically driven experiments to test predictions and assumptions outlined within the comprehensive conservation plan. The analysis of the outcome of project implementation helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Alternative - One set of objectives and strategies that could be used to achieve refuge goals and the desired future condition.

Approved Refuge Acquisition Boundary - A project boundary that the Fish and Wildlife Service approves upon completion of a detailed planning and environmental compliance process.

Biological Diversity or Biodiversity - The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur. The National Wildlife Refuge System focus for biodiversity is on indigenous species, biotic communities, and ecological processes.

Bottomland Hardwood Forests - A community of hardwood tree species that are adapted to growing in seasonally saturated soils and may have their roots inundated for a portion of the growing season.

Canopy - A layer of foliage; generally the uppermost layer in a forest stand. Canopy can be used to refer to midstory or understory vegetation in multilayered stands. Canopy closure is an estimate of the amount of overhead tree cover (also canopy cover).

Categorical Exclusion - A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act.

CFR - Code of Federal Regulations.

Compatible Use - A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the refuge manager, will not materially interfere with, or detract from, the fulfillment of the mission or the purposes of the refuge. A compatibility determination supports the selection of compatible uses for a specific refuge and identifies stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan - A document that describes the desired conditions of the refuge; provides long-range guidance and management direction for the refuge manager to accomplish the purposes, goals, and objectives of the refuge; and contributes to the mission of the National Wildlife Refuge System.

Conservation Easement - A legal document that provides specific land-use rights to a secondary party. A perpetual conservation easement usually grants conservation and management rights to a party in perpetuity.

Cooperative Agreement - A simple habitat protection action in which no property rights are required. Such an agreement is usually long-term and can be modified by either partner. Lands under a cooperative agreement do not necessarily become part of the National Wildlife Refuge System.

Cooperative Farming - Farming of refuge cropland by private individuals under the terms of a cooperative agreement.

Corridor - A route that allows movement of individuals from one region or place to another.

Cover Type - The present dominant vegetation type of an area.

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

Deciduous - Pertaining to perennial plants that are leafless for some time during the year.

Ecological Succession - The orderly progression of an area through time, in the absence of disturbance, from one vegetative and faunal community to another.

Ecosystem - A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.

Ecosystem Approach - A strategy or plan to protect and restore the natural function, structure, and species composition of an ecosystem, recognizing that all components are interrelated.

Ecosystem Management - Management of the resources of an ecosystem, taking into account all ecological, social, and economic components that make up the whole of the system. Ecosystem management attempts to ensure that all plants and animals in the ecosystem are maintained at viable levels in native habitats and that basic ecosystem processes are perpetuated.

Emergent Growth/Revegetation - Farmland or logged timber that has been reforested (early succession) or may be naturally revegetated.

Endangered Species - A plant or animal species defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range.

Endemic Species - Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.

Environmental Assessment - A concise document, prepared in accordance with the National Environmental Policy Act, which briefly discusses the purpose and need for a Federal action, as well as alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether or not to prepare an environmental impact statement or finding of no significant impact. Preparation of the document consists of a systematic analysis to determine if proposed actions would result in a significant effect on the quality of the environment.

Even-aged Forests - Forests that are composed of trees with a time span of less than 20 years between the age of the oldest and youngest individuals.

Fauna - All of the vertebrate or invertebrate animals of an area.

Federal Trust Species - All species for which the Federal Government has primary jurisdiction, including federally threatened or endangered species, migratory birds, anadromous fish, and certain marine mammals.

Fee title - The acquisition of most or all of the rights to a tract of land accomplished by a transfer of property rights with the formal conveyance of a title. While a fee title acquisition involves most rights to a property, certain rights may be reserved or not purchased, including water rights, mineral rights, or use reservation (for example, the ability to continue using the land for a specified time period, or the remainder of the owner's life).

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.

Force Account Farming - Farming of refuge cropland using refuge staff, equipment, and materials.

Fragmentation - The process of reducing the size and connectivity of habitat patches through land clearing or other development practices, often resulting in the disruption of extensive habitats into isolated and small patches.

Goals - Descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose but do not define measurable units.

Geographic Information System - A computer system capable of storing and manipulating spatial data, which is used widely in land resource quantification and management.

Habitat - The place where an organism lives. The existing environmental conditions required by an organism for survival and reproduction.

Indicator Species - A species of plant or animal that is assumed to be sensitive to habitat changes and represents the needs of a larger group of species.

Indigenous - Having originated in and being produced, growing, living, or occurring naturally in a particular region or environment.

Inholding - Privately owned land inside the boundary of a national wildlife refuge.

Issue - Any unsettled matter that requires a management decision. Examples could include: a threat to natural resources, a conflict in uses, or the presence of an undesirable resource condition.

Mid-Succession Forest - A forest generally characterized by even-aged structure resulting from human disturbance, such as timber harvest. Mid-successional forests may contain mature trees but the forest as a whole does not exhibit functional or structural characteristics associated with old-growth conditions.

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- Migratory* - Relating to the seasonal movement from one area to another and back.
- Monitoring* - The process of collecting information to track changes of selected parameters over time.
- National Environmental Policy Act of 1969* - Legislation which requires all federal agencies, including the Service, to examine the environmental impacts of their actions and incorporate environmental information and public participation in the planning and implementation of such actions. Federal agencies must integrate this Act with other planning requirements, and prepare appropriate policy documents to facilitate better environmental decision making.
- National Wildlife Refuge* - A designated area of land, water, or an interest in land or water within the National Wildlife Refuge System.
- National Wildlife Refuge System* - All lands, waters, and interests therein administered by the Fish and Wildlife Service as wildlife refuges, wildlife ranges, game ranges, wildlife management areas, waterfowl production areas, or other areas for the protection and conservation of fish, wildlife, and plant resources.
- Native Species* - Species that normally live and thrive in a particular ecosystem and are indigenous to the region.
- Neotropical Migratory Bird* - A bird species that breeds north of the United States/Mexican border and winters primarily south of that border, in an area that includes Mexico, the West Indies, Central America, and part of South America.
- Natural Levee* - Natural embankment created by soil deposited as a stream over-tops its banks. Located adjacent to a stream, a natural levee is often the highest ground in a bottomland or swamp type area.
- Objective* - An objective is a concise, quantitative (where possible) target statement of a desired management outcome. Objectives are derived from goals and provide the basis for determining management strategies. Objectives should be attainable and time-specific.
- Old Growth Forest* - Forested areas lacking frequent disturbance to vegetation, usually characterized by dominant species entered into a late successional stage and usually associated with high diversity of species, specialization, and structural complexity.
- Planning Area* - A designated area encompassed by a specific planning activity. In refuge planning, a planning area may include lands outside existing unit (refuge) boundaries that are being studied for inclusion in the unit and/or partnership planning efforts.
- Planning Team* - A planning team prepares the comprehensive conservation plan. Planning teams are interdisciplinary in membership and function. A team generally consists of the planning team leader; refuge manager and staff biologists; staff specialists or other representatives of Service programs, ecosystems, or regional offices; and state partnering wildlife agencies as appropriate.
- Preferred Alternative* - This is the Service's selected management alternative as identified in the draft comprehensive conservation plan. This is the alternative determined by the decision

maker to: best achieve the refuge purpose, vision, and goals; contribute to the Refuge System mission and address the significant issues; and be consistent with principles of sound fish and wildlife management.

Refuge Operating Needs System - This is a national database which contains the unfunded operational needs of each refuge. Projects included are those required to implement approved plans and meet goals, objectives, and legal mandates.

Refuge Purposes - These are the purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.

Scoping - A process for determining the scope of issues to be addressed by a comprehensive conservation plan and for identifying the significant issues to be addressed in that plan. Involved in the scoping process are federal, state, and local agencies, as well as private organizations and individuals.

Species - A distinctive kind of plant or animal having distinguishable characteristics, and that can interbreed and produce young. A category of biological classification.

Step-Down Management Plans - Step-down management plans provide the details necessary for implementation of management strategies and projects identified in the comprehensive conservation plan.

Strategy - A specific action, tool, or technique or combination thereof, used to achieve unit objectives.

Threatened Species - Plant or animal species that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range. Threatened species are identified and defined in accordance with the 1973 Endangered Species Act.

Trust Species - Species over which the Service has legal authority or managerial responsibility, such as threatened and endangered species, anadromous fish, and migratory birds.

Understory - Any vegetation with canopy below or closer to the ground than the canopies of other plant layers.

Vegetation - Plants in general, or the sum total of the plant life in an area.

Vegetation Type - A categorical description of the existing dominant plant species in a particular area.

Watershed - The entire land area that collects and drains water into a stream or stream system. Similar in meaning to drainage area or drainage basin.

Wetland - Areas such as lakes, marshes, and streams that are inundated by surface or ground water for a long enough period of time each year to support, and that do support under natural conditions, plants and animals that require saturated or seasonally saturated soils.

Wildlife Corridor - A landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat. Such corridors may facilitate several kinds of traffic, including frequent foraging movement, seasonal migration, or the once-in-a-lifetime dispersal of juvenile animals. These are transition habitats and need not contain all the habitat elements required by migrants for long-term survival or reproduction.

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

Wildlife Diversity - A measure of the number of wildlife species in an area and their relative abundance.

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Appendix III: Relevant Legal Mandates

American Indian Religious Freedom Act (1978): Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve Native American religious cultural rights and practices.

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

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

Archaeological and Historic Preservation Act (1974): Directs the preservation of historic and archaeological data in Federal construction projects.

Archaeological Resources Protection Act (1979) as amended: Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to locate archaeological resources.

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

Clean Water Act (1977): Requires consultation with the Corps of Engineers (404 permits) for major wetland modifications.

Emergency Wetlands Resources Act (1986): Promotes the conservation of migratory waterfowl and offsets or prevents the serious loss of wetlands by the acquisition of wetlands and other essential habitats.

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

Executive Order 11988 (1977): Each Federal agency shall provide leadership and take action to reduce the risk of flood loss and minimize the impact of floods on human safety, and preserve the natural and beneficial values served by the floodplains.

Executive Order 11990: Directs Federal agencies to (1) minimize destruction, loss, or degradation of wetlands and (2) preserve and enhance the natural and beneficial values of wetlands when a practical alternative exists.

Executive Order 12372 (Intergovernmental Review of Federal Programs): Directs the Service to send copies of environmental assessments to State planning agencies for review.

Executive Order 12898 (1994): Establishes environmental justice as a Federal Government priority and directs all Federal agencies to make environmental justice part of their mission. Environmental justice calls for fair distribution of environmental hazards.

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

Executive Order 13006 Locating Federal Facilities on Historic Properties in our Nation's Central Cities: Directs Federal agencies to select, utilize, and maintain historic properties and districts, especially those located in cities' central business districts, whenever operationally appropriate and economically prudent.

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

Federal Farmland Protection Policy Act (1981) as amended: Minimizes the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.

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

Federal Records Act (1950): Directs preservation of evidence of the government's organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

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

Fish and Wildlife Coordination Act (1934) as amended: Requires that the Fish and Wildlife Service and State fish and wildlife agencies be consulted whenever water is to be impounded, diverted, or modified under a Federal permit or license. The Service and State agency recommend measures to prevent the loss of biological resources, or to mitigate or compensate for the damage. The project proponent must take biological resource values into account and adopt justifiable protection measures to obtain maximum overall project benefits. A 1958 amendment added provisions to recognize the vital contribution of wildlife resources to the Nation and to require equal consideration and coordination of wildlife conservation with other water resources development programs. It also authorized the Secretary of the Interior to provide public fishing areas and accept donations of lands and funds.

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

Historic Sites, Buildings, and Antiquities Act (1935) as amended: Declares it a national policy to preserve historic sites and objects of national significance, including those located on refuges. Provides procedures for designation, acquisition, administration, and protection of such sites.

Land and Water Conservation Fund Act (1965): Uses the receipts from the sale of surplus Federal land, outer continental shelf oil and gas sales, and other sources for land acquisition under several authorities.

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

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

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

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

National Historic Preservation Act (1966) as amended: Requires the Federal Government to provide leadership in the preservation of the Nation's prehistoric and historic resources.

National Trails System Act: Assigns responsibility to the Secretary of the Interior and thus the Service to protect the historic and recreational values of congressionally designated National Historic Trail sites.

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

National Wildlife Refuge System Improvement Act (1997): Considered the "Organic Act" of the National Wildlife Refuge System. Defines the mission of the Refuge System, designates priority wildlife-dependent public uses, and calls for comprehensive refuge planning.

National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act (1998): Amends the Fish and Wildlife Act of 1956 to promote volunteer programs and community partnerships for the benefit of national wildlife refuges, and for other purposes.

Native American Graves Protection and Repatriation Act (1990): Requires Federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession.

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

Refuge Revenue Sharing Act (1935) as amended: Requires revenue-sharing provisions to all fee-title ownerships that are administered solely or primarily by the Secretary through the Service.

Rehabilitation Act (1973): Requires programmatic accessibility in addition to physical accessibility for all facilities and programs funded by the Federal Government to ensure that anybody can participate in any program.

Rivers and Harbors Act (1899) (U.S.C. 403): Section 10 of this Act 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.

Surface Mining Control and Reclamation Act (1977) as amended (Public Law 95-87) (SMCRA): Regulates surface mining activities and reclamation of coal-mined lands. Further regulates the coal industry by designating certain areas as unsuitable for coal mining operations.

Transfer of Certain Real Property for Wildlife Conservation Purposes Act (1948): Provides that upon a determination by the Administrator of the U.S. 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.

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.

Wilderness Act (1964) as amended: Directed the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within the National Wildlife Refuge System and National Park Service and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System, with final decisions made by Congress. The Secretary of Agriculture was directed to study and recommend suitable areas within the Forest Service.

Appendix IV: Biota

Animal and Plant Species of Hatchie National Wildlife Refuge (This is a partial list of animal and plant species found on the refuge which has been documented and verified by refuge biologists.)

Mammals known to occur on Hatchie National Wildlife Refuge

Scientific Name	Common Name
<i>Odocoileus virginianus</i>	White-tailed Deer
<i>Procyon lotor</i>	Raccoon
<i>Mustela frenata</i>	Longtail Weasel
<i>Mustela vison</i>	Mink
<i>Lutra canadensis</i>	River Otter
<i>Spilogale putoris</i>	Spotted Skunk
<i>Mephitis mephitis</i>	Striped Skunk
<i>Canis latrans</i>	Coyote
<i>Vulpes fulva</i>	Red Fox
<i>Urocyon cinereoargenteus</i>	Gray Fox
<i>Felis rufus</i>	Bobcat
<i>Corynorhinos rafinescruui</i>	Rafinesque's Big-eared Bat
<i>Eptesicus fuscus</i>	Big Brown Bat
<i>Lasionycteris noctivagans</i>	Silver-haired Bat
<i>Lasiurus borealis</i>	Red Bat
<i>Lasiurus cinereus</i>	Hoary Bat
<i>Lasiurus seminolus</i>	Seminole Bat
<i>Myotis austroriparius</i>	Southeastern Myotis
<i>Myotis lucifugus</i>	Little Brown Bat
<i>Nycticeius humeralis</i>	Evening Bat
<i>Pipistrellus subflavus</i>	Eastern Pipistrelle
<i>Sorex longirostris</i>	Southeastern Shrew
<i>Cryptotis parva</i>	Least Shrew
<i>Blarina carolinensis</i>	Southern Short-tailed Shrew
<i>Scalopus aquaticus</i>	Eastern Mole
<i>Dasypus novemcinctus</i>	Nine-banded Armadillo
<i>Sylvilagus aquaticus</i>	Swamp Rabbit
<i>Sylvilagus floridanus</i>	Eastern Cottontail
<i>Didelphis marsupialis</i>	Opossum
<i>Marmota monax</i>	Woodchuck
<i>Tamias striatus</i>	Eastern Chipmunk

Scientific Name	Common Name
<i>Sciurus carolinensis</i>	Eastern Gray Squirrel
<i>Sciurus niger</i>	Eastern Fox Squirrel
<i>Glaucomys volans</i>	Southern Flying Squirrel
<i>Castor canadensis</i>	Beaver
<i>Reithrodontomys humulis</i>	Eastern Harvest Mouse
<i>Reithrodontomys megalotis</i>	Western Harvest Mouse
<i>Peromyscus maniculatus</i>	Deer Mouse
<i>Peromyscus leucopus</i>	White-footed Mouse
<i>Peromyscus gossypinus</i>	Cotton Mouse
<i>Ochrotomys nuttallii</i>	Golden Mouse
<i>Neotoma floridana</i>	Eastern Woodrat
<i>Oryzomys palustris</i>	Marsh Rice Rat
<i>Sigmodon hispidus</i>	Hispid Cotton Rat
<i>Synaptomys pinetorum</i>	Southern Bog Lemming
<i>Microtus ochrogaster</i>	Prairie Vole
<i>Microtus pinetorum</i>	Pine Vole
<i>Ondatra zibethicus</i>	Muskrat
<i>Rattus norvegicus</i>	Norway Rat
<i>Mus musculus</i>	House Mouse
<i>Zapus hudsonius</i>	Meadow Jumping Mouse

Amphibians known to occur on Hatchie National Wildlife Refuge

Scientific Name	Common Name	Current Status*
Frogs and Toads		
<i>Acris crepitans crepitans</i>	Northern Cricket Frog	A
<i>Acris gryllus gryllus</i>	Southern Cricket Frog	LC
<i>Bufo americanus charlessmithi</i>	Dwarf American Toad	C
<i>Bufo woodhousii fowleri</i>	Fowler's Toad	SA
<i>Gastrophryne carolinensis</i>	Eastern Narrow-mouthed Toad	A
<i>Hyla avivoca</i>	Bird-voiced Treefrog	LC
<i>Hyla chrysoscelis versicolor</i>	Gray Treefrog	SA
<i>Hyla cinerea</i>	Green Treefrog	LC
<i>Pseudacris crucifer crucifer</i>	Northern Spring Peeper	A
<i>Pseudacris triseriata feriarum</i>	Upland Chorus Frog	A
<i>Rana areolata circulosa</i>	Northern Crawfish Frog	U
<i>Rana catesbeiana</i>	Bullfrog	A
<i>Rana clamitans clamitans or melanota</i>	Greenfrog	A
<i>Rana palustris</i>	Pickerel Frog	U
<i>Rana utricularia</i>	Southern Leopard Frog	A
<i>Scaphiopus holbrooki holbrooki</i>	Eastern Spadefoot Toad	LC
Salamanders		
<i>Ambystoma maculatum</i>	Spotted Salamander	LC
<i>Ambystoma opacum</i>	Marble Salamander	LC
<i>Ambystoma talpoideum</i>	Mole Salamander	U
<i>Ambystoma texanum</i>	Small-mouthed Salamander	C
<i>Ambystoma tigrinum tigrinum</i>	Eastern Tiger Salamander	R
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	C
<i>Desmognathus fusus conanti</i>	Spotted Dusky Salamander	LC
<i>Eurycea cirrigera</i>	Southern Two-lined Salamander	A
<i>Eurycea longicauda</i>	Long-tailed Salamander	SU
<i>Necturus maculosus maculosus</i>	Mudpuppy	U
<i>Notophthalmus viridescens louisianensis</i>	Central Newt	LC
<i>Plethedon mississippii</i>	Mississippi Slimy Salamander	C
<i>Pseudotriton ruber vioscai</i>	Southern Red Salamander	A
<i>Siren intermedia nettingi</i>	Western Lesser Siren	LC

* Current Status - Derived from the WTWR Conservation Plan (TWRA and USFWS 2002). Indicates current status of species in west Tennessee. Key: SA - Super Abundant, A - Abundant, C - Common, LC - Locally Common, U - Uncommon, R - Rare, SU - Status Unknown.

Reptiles known to occur on Hatchie National Wildlife Refuge

Scientific Name	Common Name	Current Status*
Lizards		
<i>Cnemidophorus sexlineatus sexlineatus</i>	Six-lined Racerunner	U
<i>Eumeces fasciatus</i>	Five-lined Skink	A
<i>Eumeces laticeps</i>	Broad-head Skink	A
<i>Ophisaurus attenuatus longicaudus</i>	Eastern Slender Glass Lizard	U
<i>Sceloporus undulatus hyacinthinus</i>	Northern Fence Lizard	A
<i>Scincella lateralis</i>	Ground Skink	SA
Snakes		
<i>Agkistrodon contortrix contortrix</i> or <i>mokasen</i>	Southern or Northern Copperhead	C
<i>Agkistrodon piscivorus leucostoma</i>	Western Cottonmouth Snake	LC
<i>Carphophis amoenus helenae</i>	Midwest Worm Snake	U
<i>Cemophora coccinea copei</i>	Northern Scarlet Snake	R
<i>Coluber constrictor priapus</i> or <i>latrunculus</i>	Southern Black Racer	A
<i>Crotalus horridus atricaudatus</i>	Canebrake Rattlesnake	U
<i>Diadophis punctatus strictogenys</i>	Mississippi Ringneck Snake	A
<i>Elaphe obsoleta spiloides</i>	Gray Rat Snake	A
<i>Faracura abacura reinwardtii</i>	Western Mud Snake	R
<i>Heterodon platyrhinos</i>	Eastern Hognose Snake	U
<i>Lampropeltis caligaster caligaster</i> or <i>rhombomaculata</i>	Prairie King Snake	U
<i>Lampropeltis getula nigra</i> or <i>holbrookii</i>	Speckled King Snake	C
<i>Lampropeltis triangulum sypila</i> of <i>elapsoides</i>	Red Milk Snake	U
<i>Nerodia cyclopion</i>	Green Water Snake	U
<i>Nerodia erythrogaster flavigaster</i>	Yellow-bellied Water Snake	C
<i>Nerodia fasciata confluens</i>	Broad-banded Water Snake	C
<i>Nerodia rhombifer</i>	Diamondback Water Snake	C
<i>Nerodia sipedon pleuralis</i>	Midland Water Snake	C
<i>Opheodrys aestivus</i>	Rough Green Snake	C
<i>Storeiria decayi wrightorum</i>	Midland Brown Snake	C
<i>Storeiria occipitmaculata occipitmaculata</i> or <i>obscura</i>	Northern or Florida Red-bellied Snake	U
<i>Tantilla coronata</i>	Southeastern Crowned Snake	U
<i>Thamnophis proximus proximus</i>	Western Ribbon Snake	U
<i>Thamnophis sauritus sauritus</i>	Eastern Ribbon Snake	C
<i>Thamnophis sirtalis sirtalis</i>	Eastern Garter Snake	SA

Scientific Name	Common Name	Current Status*
<i>Virginia valeriae elegans</i>	Western Smooth Earth Snake	U
Turtle		
<i>Apalone mutica mutica</i>	Smooth Softshell Turtle	U
<i>Apalone spinifera spinifera</i>	Eastern Spiny Softshell	C
<i>Chelydra serpentina</i>	Common Snapping Turtle	A
<i>Chrysemys picta dorsalis</i>	Southern Painted Turtle	U
<i>Graptemys kohnii</i>	Mississippi Map Turtle	U
<i>Graptemys pseudogeographica ouachitensis</i>	Ouachita Map Turtle	C
<i>Kinosternon subrubrum subrubrum</i> or <i>hippocrepis</i>	Eastern or Mississippi Mud Turtle	U
<i>Macrolemys temminckii</i>	Alligator Snapping Turtle	R
<i>Pseudemys cocinna hieroglyphica</i> or <i>metteri</i>	Missouri River Cooter	A
<i>Sternotherus odoratus</i>	Stinkpot Turtle	SU
<i>Terrapene carolina carolina</i>	Eastern Box Turtle	C
<i>Trachemys scripta carolina</i>	Red-eared Slider	SA

* Current Status - Derived from the WTWR Conservation Plan (TWRA and USFWS 2002). Indicates current status of species in west Tennessee. Key: SA - Super Abundant, A - Abundant, C- Common, LC - Locally Common, U - Uncommon, R - Rare, SU - Status Unknown.

Birds known to occur on Hatchie National Wildlife Refuge and residence status

Common Name	Scientific Name	Class	Residence	Status	Exotic
Common Loon	<i>Gavia immer</i>	Aves	Migrant		
Pied-billed Grebe	<i>Podilymbus podiceps</i>	Aves	Migrant		
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	Aves	Migrant		
Anhinga	<i>Anhinga anhinga</i>	Aves	Migrant		
American Bittern	<i>Botaurus lentiginosus</i>	Aves	Migrant		
Least Bittern	<i>Ixobrychus exilis</i>	Aves	Migrant		
Great Blue Heron	<i>Ardea herodias</i>	Aves	Permanent resident		
Great Egret	<i>Casmerodius albus</i>	Aves	Migrant		
Snowy Egret	<i>Egretta thula</i>	Aves	Migrant		
Little Blue Heron	<i>Egretta caerulea</i>	Aves	Migrant		
Cattle Egret	<i>Bubulcus ibis</i>	Aves	Migrant		
Green-backed heron	<i>Butorides striatus</i>	Aves	Migrant		
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	Aves	Permanent resident		
Yellow-crowned Night-Heron	<i>Nycticorax violaceus</i>	Aves	Migrant		
White Ibis	<i>Eudocimus albus</i>	Aves	Migrant		
Tundra Swan	<i>Cygnus columbianus</i>	Aves	Migrant		
Snow Goose	<i>Chen caerulescens</i>	Aves	Migrant		
Ross' Goose	<i>Chen rossii</i>	Aves	Accidental		
Canada Goose	<i>Branta canadensis</i>	Aves	Resident/migrant		
Wood Duck	<i>Aix sponsa</i>	Aves	Migrant		
Green-Winged Teal	<i>Anas crecca</i>	Aves	Migrant		
American Black Duck	<i>Anas rubripes</i>	Aves	Migrant		
Mallard	<i>Anas platyrhynchos</i>	Aves	Migrant		
Northern Pintail	<i>Anas acuta</i>	Aves	Migrant		
Blue-winged Teal	<i>Anas discors</i>	Aves	Migrant		
Northern Shoveler	<i>Anas clypeata</i>	Aves	Migrant		
Gadwall	<i>Anas strepera</i>	Aves	Migrant		
American Widgeon	<i>Anas americana</i>	Aves	Migrant		
Canvasback	<i>Aythya valisineria</i>	Aves	Migrant		
Redhead	<i>Aythya americana</i>	Aves	Migrant		
Ring-necked Duck	<i>Aythya collaris</i>	Aves	Migrant		
Lesser Scaup	<i>Aythya affinis</i>	Aves	Migrant		
Common Goldeneye	<i>Bucephala clangula</i>	Aves	Migrant		
Bufflehead	<i>Bucephala albeola</i>	Aves	Migrant		
Hooded Merganser	<i>Lophodytes cucullatus</i>	Aves	Permanent		

Common Name	Scientific Name	Class	Residence	Status	Exotic
			resident		
Common Merganser	<i>Mergus merganser</i>	Aves	Migrant		
Red-breasted Merganser	<i>Mergus serrator</i>	Aves	Migrant		
Ruddy Duck	<i>Oxyura jamaicensis</i>	Aves	Migrant		
Black Vulture	<i>Coragyps atratus</i>	Aves	Permanent resident		
Turkey Vulture	<i>Cathartes aura</i>	Aves	Permanent resident		
Osprey	<i>Pandion haliaetus</i>	Aves	Migrant	State End.	
Mississippi Kite	<i>Ictinia mississippiensis</i>	Aves	Migrant	State End.	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Aves	Migrant	Fed. Thr.	
Northern Harrier	<i>Circus cyaneus</i>	Aves	Migrant	State Thr.	
Sharp-shinned hawk	<i>Accipiter striatus</i>	Aves	Migrant	State Thr.	
Cooper's Hawk	<i>Accipiter cooperii</i>	Aves	Permanent resident	State Thr.	
Northern Goshawk	<i>Accipiter gentilis</i>	Aves	Migrant		
Red-shouldered Hawk	<i>Buteo lineatus</i>	Aves	Permanent resident		
Broad-winged Hawk	<i>Buteo platypterus</i>	Aves	Migrant		
Red-tailed Hawk	<i>Buteo jamaicensis</i>	Aves	Permanent resident		
Rough-legged Hawk	<i>Buteo lagopus</i>	Aves	Migrant		
Golden Eagle	<i>Aquila chrysaetos</i>	Aves	Migrant	State End.	
American Kestrel	<i>Falco sparverius</i>	Aves	Permanent resident		
Wild Turkey	<i>Meleagris gallopavo</i>	Aves	Permanent resident		
Northern Bobwhite	<i>Colinus virginianus</i>	Aves	Permanent resident		
Sora	<i>Porzana carolina</i>	Aves	Migrant		
Common Moorhen	<i>Gallinula chloropus</i>	Aves	Migrant		
American Coot	<i>Fulica americana</i>	Aves	Migrant		
Semipalmated Plover	<i>Charadrius semipalmatus</i>	Aves	Migrant		
Killdeer	<i>Charadrius vociferus</i>	Aves	Permanent resident		
Lesser Golden Plover	<i>Pluvialis dominica</i>	Aves	Migrant		
Greater Yellowlegs	<i>Tringa melanoleuca</i>	Aves	Migrant		
Lesser Yellowlegs	<i>Tringa flavipes</i>	Aves	Migrant		
Solitary Sandpiper	<i>Tringa solitaria</i>	Aves	Migrant		
Spotted Sandpiper	<i>Actitis macularia</i>	Aves	Migrant		
Upland Sandpiper	<i>Batramia longicauda</i>	Aves	Migrant		
Semipalmated	<i>Calidris pusilla</i>	Aves	Migrant		

Common Name	Scientific Name	Class	Residence	Status	Exotic
Sandpiper					
Western Sandpiper	<i>Calidris mauri</i>	Aves	Migrant		
Least Sandpiper	<i>Calidris minutilla</i>	Aves	Migrant		
Pectoral Sandpiper	<i>Calidris melanotos</i>	Aves	Migrant		
Common Snipe	<i>Gallinago gallinago</i>	Aves	Migrant		
American Woodcock	<i>Scolopax minor</i>	Aves	Migrant		
Ringed-billed Gull	<i>Larus delawarensis</i>	Aves	Migrant		
Common Tern	<i>Sterna hirundo</i>	Aves	Migrant		
Forster's Tern	<i>Sterna forsteri</i>	Aves	Migrant		
Black Tern	<i>Chlidonias niger</i>	Aves	Migrant		
Rock Dove	<i>Columba livia</i>	Aves	Permanent resident		
Mourning Dove	<i>Zenaida macroura</i>	Aves	Permanent resident		
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Aves	Migrant		
Common Barn-Owl	<i>Tyto alba</i>	Aves	Permanent resident		
Eastern Screech-Owl	<i>Otus asio</i>	Aves	Permanent resident		
Great Horned Owl	<i>Bubo virginianus</i>	Aves	Permanent resident		
Barred Owl	<i>Strix varia</i>	Aves	Permanent resident		
Short-eared Owl	<i>Asio flammeus</i>	Aves	Migrant		
Common Nighthawk	<i>Chordeiles minor</i>	Aves	Migrant		
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>	Aves	Migrant		
Whip-poor-will	<i>Caprimulgus vociferus</i>	Aves	Migrant		
Chimney Swift	<i>Chaetura pelagica</i>	Aves	Migrant		
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	Aves	Migrant		
Belted Kingfisher	<i>Ceryle alcyon</i>	Aves	Permanent resident		
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Aves	Permanent resident		
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	Aves	Permanent resident		
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Aves	Migrant		
Downy Woodpecker	<i>Picoides pubescens</i>	Aves	Permanent resident		
Hairy Woodpecker	<i>Picoides villosus</i>	Aves	Permanent resident		
Northern Flicker	<i>Colaptes auratus</i>	Aves	Permanent		

Common Name	Scientific Name	Class	Residence	Status	Exotic
			resident		
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Aves	Permanent resident		
Eastern Wood Peewee	<i>Contopus virens</i>	Aves	Migrant		
Acadian Flycatcher	<i>Empidonax virens</i>	Aves	Migrant		
Willow Flycatcher	<i>Empidonax traillii</i>	Aves	Migrant		
Least Flycatcher	<i>Empidonax minimus</i>	Aves	Migrant		
Eastern Phoebe	<i>Sayornis phoebe</i>	Aves	Migrant		
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	Aves	Migrant		
Eastern Kingbird	<i>Tyrannus tyrannus</i>	Aves	Migrant		
Scissor-tailed Flycatcher	<i>Tyrannus forficatus</i>	Aves	Migrant		
Horned Lark	<i>Eremophila alpestris</i>	Aves	Permanent resident		
Purple Martin	<i>Progne subis</i>	Aves	Migrant		
Tree Swallow	<i>Tachycineta bicolor</i>	Aves	Migrant		
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Aves	Migrant		
Bank Swallow	<i>Riparia riparia</i>	Aves	Migrant		
Cliff Swallow	<i>Hirundo pyrrhonota</i>	Aves	Migrant		
Barn Swallow	<i>Hirundo rustica</i>	Aves	Migrant		
Blue Jay	<i>Cyanocitta cristata</i>	Aves	Permanent resident		
American Crow	<i>Corvus brachyrhynchos</i>	Aves	Permanent resident		
Fish Crow	<i>Corvus ossifragus</i>	Aves	Permanent resident		
Carolina Chickadee	<i>Parus carolinensis</i>	Aves	Permanent resident		
Tufted Titmouse	<i>Parus bicolor</i>	Aves	Permanent resident		
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Aves	Migrant		
White-breasted Nuthatch	<i>Sitta carolinensis</i>	Aves	Permanent resident		
Brown Creeper	<i>Certhia americana</i>	Aves	Migrant		
Carolina Wren	<i>Thryothorus ludovicianus</i>	Aves	Permanent resident		
Bewick's Wren	<i>Thryomanes bewickii</i>	Aves	Permanent resident	State - Thr	
Winter Wren	<i>Troglodytes troglodytes</i>	Aves	Migrant		
Golden-crowned	<i>Regulus satrapa</i>	Aves	Migrant		

Common Name	Scientific Name	Class	Residence	Status	Exotic
Kinglet					
Ruby-crowned Kinglet	<i>Regulus calendula</i>	Aves	Migrant		
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	Aves	Migrant		
Eastern Bluebird	<i>Sialia sialis</i>	Aves	Permanent resident		
Hermit Thrush	<i>Catharus guttatus</i>	Aves	Migrant		
Wood Thrush	<i>Hylocichla mustelina</i>	Aves	Migrant		
American Robin	<i>Turdus migratorius</i>	Aves	Permanent resident		
Gray Catbird	<i>Dumetella carolinensis</i>	Aves	Migrant		
Northern Mockingbird	<i>Mimus polyglottos</i>	Aves	Permanent resident		
Brown Thrasher	<i>Toxostoma rufum</i>	Aves	Migrant		
Water Pipit	<i>Anthus spinoletta</i>	Aves	Migrant		
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Aves	Migrant		
Loggerhead Shrike	<i>Lanius ludovicianus</i>	Aves	Permanent resident		
European Starling	<i>Sturnus vulgaris</i>	Aves	Permanent resident		
White-eyed Vireo	<i>Vireo griseus</i>	Aves	Migrant		
Bell's Vireo	<i>Vireo bellii</i>	Aves	Accidental		
Solitary Vireo	<i>Vireo solitarius</i>	Aves	Migrant		
Yellow-throated Vireo	<i>Vireo flavifrons</i>	Aves	Migrant		
Warbling Vireo	<i>Vireo gilvus</i>	Aves	Migrant		
Philadelphia Vireo	<i>Vireo philadelphicus</i>	Aves	Migrant		
Red-eyed Vireo	<i>Vireo olivaceus</i>	Aves	Migrant		
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	Aves	Migrant		
Tennessee Warbler	<i>Vermivora peregrina</i>	Aves	Migrant		
Orange-crowned Warbler	<i>Vermivora celata</i>	Aves	Accidental		
Northern Parula	<i>Parula americana</i>	Aves	Migrant		
Yellow Warbler	<i>Dendroica petechia</i>	Aves	Migrant		
Yellow-rumped Warbler	<i>Dendroica coronata</i>	Aves	Migrant		
Yellow-throated Warbler	<i>Dendroica dominica</i>	Aves	Migrant		
Pine Warbler	<i>Dendroica pinus</i>	Aves	Migrant		
Prairie Warbler	<i>Dendroica discolor</i>	Aves	Migrant		
Cerulean Warbler	<i>Dendroica cerulea</i>	Aves	Migrant		
Black and White Warbler	<i>Mniotilta varia</i>	Aves	Accidental		

Common Name	Scientific Name	Class	Residence	Status	Exotic
American Redstart	<i>Setophaga ruticilla</i>	Aves	Migrant		
Prothonotary Warbler	<i>Protonotaria citrea</i>	Aves	Migrant		
Worm-eating Warbler	<i>Helmitheros vermivorus</i>	Aves	Accidental		
Swainson's Warbler	<i>Limnothlypis swainsonii</i>	Aves	Migrant	State - D	
Ovenbird	<i>Seiurus aurocapillus</i>	Aves	Migrant		
Northern Waterthrush	<i>Seiurus noveboracensis</i>	Aves	Migrant		
Louisiana Waterthrush	<i>Seiurus motacilla</i>	Aves	Migrant		
Kentucky Warbler	<i>Oporornis formosus</i>	Aves	Migrant		
Common Yellowthroat	<i>Geothlypis trichas</i>	Aves	Migrant		
Hooded Warbler	<i>Wilsonia citrina</i>	Aves	Migrant		
Yellow-breasted Chat	<i>Icteria virens</i>	Aves	Migrant		
Summer Tanager	<i>Piranga rubra</i>	Aves	Migrant		
Scarlet Tanager	<i>Piranga olivacea</i>	Aves	Migrant		
Northern Cardinal	<i>Cardinalis cardinalis</i>	Aves	Permanent resident		
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Aves	Migrant		
Blue Grosbeak	<i>Guiraca caerulea</i>	Aves	Migrant		
Indigo Bunting	<i>Passerina cyanea</i>	Aves	Migrant		
Dickcissel	<i>Spiza americana</i>	Aves	Migrant		
Rufous-sided Towhee	<i>Pipilo erythrophthalmus</i>	Aves	Migrant		
Bachman's Sparrow	<i>Aimophila aestivalis</i>	Aves	Migrant	State - Thr	
Chipping Sparrow	<i>Spizella passerina</i>	Aves	Migrant		
Field Sparrow	<i>Spizella pusilla</i>	Aves	Permanent resident		
Vesper Sparrow	<i>Pooecetes gramineus</i>	Aves	Migrant		
Lark Sparrow	<i>Chondestes grammacus</i>	Aves	Migrant		
Savannah Sparrow	<i>Passerculus sandwichensis</i>	Aves	Migrant		
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Aves	Migrant	State - Thr	
LeConte's Sparrow	<i>Ammodramus leconteii</i>	Aves	Accidental		
Fox Sparrow	<i>Passerella iliaca</i>	Aves	Migrant		
Song Sparrow	<i>Melospiza melodia</i>	Aves	Permanent resident		
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	Aves	Accidental		
Swamp Sparrow	<i>Melospiza georgiana</i>	Aves	Migrant		
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Aves	Migrant		
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	Aves	Migrant		
Harris' Sparrow	<i>Zonotrichia querula</i>	Aves	Accidental		
Dark-eyed Junco	<i>Junco hyemalis</i>	Aves	Migrant		

Common Name	Scientific Name	Class	Residence	Status	Exotic
Lapland Longspur	<i>Calcarius lapponicus</i>	Aves	Migrant		
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Aves	Permanent resident		
Eastern Meadowlark	<i>Sturnella magna</i>	Aves	Permanent resident		
Rusty Blackbird	<i>Euphagus carolinus</i>	Aves	Migrant		
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	Aves	Migrant		
Common Grackle	<i>Quiscalus quiscula</i>	Aves	Permanent resident		
Brown-headed Cowbird	<i>Molothrus ater</i>	Aves	Permanent resident		
Orchard Oriole	<i>Icterus spurius</i>	Aves	Migrant		
Northern Oriole	<i>Icterus galbula</i>	Aves	Migrant		
Purple Finch	<i>Carpodacus purpureus</i>	Aves	Migrant		
House Finch	<i>Carpodacus mexicanus</i>	Aves	Migrant		
Pine Siskin	<i>Carduelis pinus</i>	Aves	Migrant		
American Goldfinch	<i>Carduelis tristis</i>	Aves	Permanent resident		
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Aves	Accidental		
House Sparrow	<i>Passer domesticus</i>	Aves	Permanent resident		

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Nicholson, C.P. 1997. *Atlas of the breeding birds of Tennessee*. The University of Tennessee Press, Knoxville, 426 pages.

Robinson, J.C. 1990. *An annotated checklist of the birds of Tennessee*. The University of Tennessee Press, Knoxville, 274 pages.

Fishes of the Hatchie River

Scientific Name	Common Name
<i>Alosa chrysochloris</i>	Skipjack Herring
<i>Ameiurus melas</i>	Black Bullhead
<i>Ameiurus natalis</i>	Yellow Bullhead
<i>Amia calva</i>	Bowfin
<i>Ammocrypta beani</i>	Naked Sand Darter
<i>Ammocrypta vivax</i>	Scaly Sand Darter
<i>Aphredoderus sayanus</i>	Pirate Perch
<i>Aplodinotus grunniens</i>	Freshwater Drum
<i>Atractosteus spatula</i>	Alligator Gar
<i>Carassius auratus</i>	Gold Fish*
<i>Carpiodes carpio</i>	River Carpsucker
<i>Carpiodes cyprinus</i>	Quillback
<i>Centrarchus macropterus</i>	Flier
<i>Ctenopharyngodon idella</i>	Grass Carp*
<i>Cycleptus elongatus</i>	Blue Sucker
<i>Cyprinella camura</i>	Bluntnose Shiner
<i>Cyprinella lutrensis</i>	Red Shiner
<i>Cyprinella venusta</i>	Blacktail Shiner
<i>Cyprinus carpio</i>	Common Carp*
<i>Dorosoma cepedianum</i>	Gizzard Shad
<i>Dorosoma petenense</i>	Threadfin Shad
<i>Elassoma zonatum</i>	Banded Sunfish
<i>Erimyzon oblongus</i>	Creek Chubsucker
<i>Esox americanus</i>	Grass Pickerel
<i>Esox niger</i>	Chain Pickerel
<i>Etheostoma asprigene</i>	Mud Darter
<i>Etheostoma chlorosomum</i>	Bluntnose Darter
<i>Etheostoma fusiforme</i>	Swamp Darter
<i>Etheostoma gracile</i>	Slough Darter
<i>Etheostoma histrio</i>	Harlequin Darter
<i>Etheostoma lynceum</i>	Brighteye Darter
<i>Etheostoma parvipinne</i>	Goldstripe Darter
<i>Etheostoma proeliare</i>	Cypress Darter
<i>Etheostoma stigmaeum</i>	Speckled Darter
<i>Etheostoma swaini</i>	Gulf Darter
<i>Etheostoma zonistium</i>	Bandfin Darter

Scientific Name	Common Name
<i>Fundulus dispar</i>	Northern Starhead Topminnow
<i>Fundulus notatus</i>	Blackstripe Topminnow
<i>Fundulus olivaceus</i>	Black Spotted Topminnow
<i>Gambusia affinis</i>	Western Mosquitofish
<i>Hiodon alosoides</i>	Goldeye
<i>Hiodon tergisus</i>	Mooneye
<i>Hybognathus hayi</i>	Cypress Shiner
<i>Hybognathus nuchalis</i>	Silvery Shiner
<i>Hybopsis amnis</i>	Pallid Shiner
<i>Hypentelium nigricans</i>	Northern Hogsucker
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey
<i>Ictalurus furcatus</i>	Blue Catfish
<i>Ictalurus punctatus</i>	Channel Catfish
<i>Ictiobus bubalus</i>	Smallmouth Buffalo
<i>Ictiobus niger</i>	Black Buffalo
<i>Labidesthes sicculus</i>	Brook Silverside
<i>Lamptera aepyptera</i>	Least Brook Lamprey
<i>Lepisosteus oculatus</i>	Spotted Gar
<i>Lepisosteus platostomus</i>	Shortnose Gar
<i>Lepisosteus osseus</i>	Longnose Gar
<i>Lepomis cyanellus</i>	Green Sunfish
<i>Lepomis gulosus</i>	Warmouth
<i>Lepomis humilis</i>	Orange Spotted Sunfish
<i>Lepomis macrochirus</i>	Bluegill
<i>Lepomis marginatus</i>	Dollar Sunfish
<i>Lepomis megalotus</i>	Longear Sunfish
<i>Lepomis microlophus</i>	Redear Sunfish
<i>Lepomis punctatus</i>	Bantam Sunfish
<i>Luxilus chrysocephalus</i>	Striped Shiner
<i>Lythrurus fumeus</i>	Ribbon Shiner
<i>Lythrurus umbratilis</i>	Redfin Shiner
<i>Machrhybopsis aestivalis</i>	Speckled Chub
<i>Machrhybopsis gelida</i>	Sturgeon Chub
<i>Machrhybopsis storeriana</i>	Silver Chub
<i>Micropterus punctulatus</i>	Spotted Bass
<i>Micropterus salmoides</i>	Largemouth Bass
<i>Minytrema melanops</i>	Spotted Sucker

Scientific Name	Common Name
<i>Morone chrysops</i>	White Bass
<i>Moxostoma erythrurum</i>	Golden Redhorse
<i>Moxostoma poecilurum</i>	Blacktail Redhorse
<i>Notemigonus crysoleucas</i>	Golden Shiner
<i>Noturus gyrinus</i>	Tadpole Madtom
<i>Noturus hildebrandi</i>	Least Madtom
<i>Noturus miurus</i>	Brindled Madtom
<i>Noturus nocturnus</i>	Freckled Madtom
<i>Noturus phaeus</i>	Brown Madtom
<i>Noturus stigmosus</i>	Northern Madtom
<i>Notropis ammophilus</i>	Orangefin Shiner
<i>Notropis atherinoides</i>	Emerald Shiner
<i>Notropis blennioides</i>	River Shiner
<i>Notropis maculatus</i>	Taillight Shiner
<i>Notropis shumardi</i>	Silverband Shiner
<i>Notropis volucellus</i>	Mimic Shiner
<i>Opsopoeodus emiliae</i>	Pugnose Minnow
<i>Percina maculata</i>	Blackside Darter
<i>Percina sciera</i>	Dusky Darter
<i>Percina shumardi</i>	River Darter
<i>Percina vigil</i>	Saddleback Darter
<i>Pimephales notatus</i>	Bluntnose Minnow
<i>Pimephales vigilax</i>	Bullhead Minnow
<i>Polyodon spathula</i>	Paddlefish
<i>Pomoxis annularis</i>	White Crappie
<i>Pomoxis nigromaculatus</i>	Black Crappie
<i>Pylodictis olivaris</i>	Flathead Catfish
<i>Semotilus atromaculatus</i>	Creek Chub
<i>Stizostedion canadense</i>	Sauger

Mussels known to occur in the Hatchie River

(Table shows the results of Hatchie River mussel surveys conducted by Manning (1981-83), TWRA (1991), and TNC (1999)).

Species	1980-83 *	1991	1999
Amblema plicata	C	128	81
Anodonta suborbiculata	UC	32	8
Arcidens confragosus	UC	1	1
Fusconaia ebena	Relic	0	0
Fusconaia flava	R	1	1
Lampsilis cardium	C	26	10
Lampsilis siliquoidea	0	0	1
Lampsilis teres	A	40	53
Lasmigona complanata	UC	6	14
Leptodea fragilis	C	7	21
Ligumia subrostrata	C	30	Relic
Megaloniais nervosa	C	38	165
Obliquaria reflexa	Relic	0	0
Obovaria jacksoniana	R	0	0
Plectomerus dombeyanus	C	49	145
Plethobasus cyphus	Relic	0	0
Potamilus alatus	0	0	1
Potamilus ohioensis	R	0	2
Potamilus purpuratus	C	74	79
Pyganodon grandis	C	79	69
Quadrula apiculata	0	0	1
Quadrula nodulata	R	6	1
Quadrula pustulosa	A	161	366
Quadrula quadrula	C	8	19
Strophitus undulatus	R	0	0
Toxolasma parvus	C	0	0
Toxolasma texasensis	C	14	12
Tritogonia verrucosa	C	94	98
Truncilla truncata	R	0	0
Uniomerus declivis	R	0	9
Uniomerus tetralasmus	C	1	0
Utterbackia imbecillis	UC	0	41
Villosa lienosa	C	3	14
Villosa vibex	C	1	1

* Manning did not report exact numbers, instead using a ranking system as follows:

A = large numbers observed at most suitable stations.

C = small numbers observed at most suitable stations.

UC = found at less than half of suitable stations.

R = found at only one station, or represented by only a few specimens.

Relic = empty shells only.

Forest trees and shrubs known to occur on Hatchie National Wildlife Refuge

Scientific Name	Common Name
<i>Acer barbatum</i>	Florida Maple
<i>Acer negundo</i>	Boxelder
<i>Acer rubrum</i>	Red Maple
<i>Asimina triloba</i>	Pawpaw
<i>Carya aquatica</i>	Bitter Pecan (Water Hickory)
<i>Carya illinoensis</i>	Sweet Pecan
<i>Carya laciniosa</i>	Shellbark Hickory
<i>Carya ovata</i>	Shagbark Hickory
<i>Carya tomentosa</i>	Mockernut Hickory
<i>Celtis laevigata</i>	Sugarberry
<i>Celtis occidentalis</i>	Hackberry
<i>Cephalanthus occidentalis</i>	Buttonbush
<i>Cercis canadensis</i>	Redbud
<i>Cornus drummondii</i>	Roughleaf Dogwood
<i>Cornus florida</i>	Flowering Dogwood
<i>Diospyros virginiana</i>	Persimmon
<i>Fagus grandifolia</i>	American Beech
<i>Forestiera acuminata</i>	Swamp Privet
<i>Fraxinus pennsylvanica</i>	Green Ash
<i>Gleditsia triacanthos</i>	Honey Locust
<i>Gymnocladus dioica</i>	Coffeetree
<i>Ilex decidua</i>	Possum Haw (Deciduous Holly)
<i>Juglans nigra</i>	Black Walnut
<i>Liquidambar styraciflua</i>	Sweetgum
<i>Liriodendron tulipifera</i>	Yellow Poplar
<i>Maclura pomifera</i>	Osage Orange (Bois D'arc)
<i>Morus rubra</i>	Red Mulberry
<i>Nyssa aquatica</i>	Tupelo
<i>Nyssa sylvatica</i>	Black Gum
<i>Planera aquatica</i>	Water Elm
<i>Platanus occidentalis</i>	Sycamore
<i>Populus deltoides</i>	Eastern Cottonwood
<i>Quercus alba</i>	White Oak
<i>Quercus falcata</i>	Southern Red Oak
<i>Quercus falcata var. pagodaefolia</i>	Cherrybark Oak

Scientific Name	Common Name
<i>Quercus lyrata</i>	Overcup Oak
<i>Quercus michauxii</i>	Swamp Chestnut Oak
<i>Quercus nigra</i>	Water Oak
<i>Quercus nuttallii</i>	Nuttall Oak
<i>Quercus palustris</i>	Pin Oak
<i>Quercus phellos</i>	Willow Oak
<i>Quercus shumardii</i>	Shumard Oak
<i>Quercus stellata</i>	Post Oak
<i>Salix nigra</i>	Black Willow
<i>Sassafras albidum</i>	Sassafras
<i>Taxodium distichum</i>	Baldcypress
<i>Ulmus americana</i>	American Elm

Herbaceous Plants Known to Occur on Hatchie NWR

Scientific Name	Common name
<i>Amaranthus retroflexus</i>	Pigweed
<i>Ambrosia artemisiifolia</i>	Common ragweed
<i>Ambrosia trifida</i>	Giant ragweed
<i>Andropogon gerardii</i>	Big bluestem
<i>Andropogon virginicus</i>	Broomsedge
<i>Ammania coccinea</i>	Toothcup
<i>Aster</i> spp.	Aster
<i>Azolla caroliniana</i>	Waterfern
<i>Bidens</i> spp	Beggartick
<i>Chamaecrista fasciculata</i>	Partridge pea
<i>Cyperus erythrorhizos</i>	Red rooted sedge
<i>Cyperus esculentus</i>	Chufa
<i>Cyperus</i> spp.	Flatsedge
<i>Ceratophyllum demersum</i>	Coon's tail
<i>Digitaria didactyla</i>	Crabgrass
<i>Echinochloa colona</i>	Jungle rice
<i>Echinochloa crusgalli</i>	Barnyard Grass
<i>Echinochloa muricata</i>	Wild millet
<i>Eleocharis obtusa</i>	Blunt spikerush
<i>Elodea canadensis</i>	Elodea
<i>Fagopyrum esculentum</i>	Buckwheat
<i>Glycine max</i>	Soybean
<i>Hibiscus moscheutos</i>	Swamp rosemallow
<i>Ipomoea purpurea</i>	Common morning glory
<i>Iva frutescens</i>	Marsh elder
<i>Leersia oryzoides</i>	Rice cut-grass
<i>Lemna</i> spp.	Duckweeds
<i>Leptachloa filiformis</i>	Sprangletop
<i>Nelumbo lutea</i>	American lotus
<i>Nymphaea advena</i>	Yellow pond-lily
<i>Oryza sativa</i>	Rice
<i>Panicum dichotomiflorum</i>	Fall panicum
<i>Panicum virgatum</i>	Switchgrass
<i>Polygonum lapathifolium</i>	Lady's thumb
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed
<i>Potamogeton crispus</i>	Curlyleaf pondweed

Scientific Name	Common name
Pueraria montana	Kudzu
Rhynchospora corniculata	Horned beaked-rush
Sagittaria platyphylla	Delta arrow-head
Saururus cernuus	Lizard's tail
Schizachyrium scoparium	Little bluestem
Sesbania cannabina	Sesbania
Solidago altissima	Goldenrod
Sorghastrum nutans	Indiangrass
Sorghum bicolor	Grain sorghum
Triticum aestivum	Wheat
Utricularia spp.	Bladderwort
Xanthium strumarium	Cocklebur
Zea mays	Corn

Appendix V: Decisions and Approvals

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION

REGION 4 INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Randy Cook, Refuge Manager
Telephone Number: 731-287-0650 **E-Mail:** Randy_Cook@fws.gov
Date: _____

PROJECT NAME : Comprehensive Conservation Plan, Hatchie National Wildlife Refuge

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
- Refuges/Wildlife

II. State/Agency: Tennessee/U.S. Fish and Wildlife Service

III. Station Names: Hatchie National Wildlife Refuge

IV. Description of Proposed Action (attach additional pages as needed): Implementation of the Comprehensive Conservation Plan for Hatchie National Wildlife Refuge by adopting the preferred alternative of Balanced Public Use and Habitat Management, which will provide guidance, management direction, and operation plans for the next 15 years.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map:

As many as 5 bald eagles have been known to winter in the vicinity of Hatchie Refuge, with no known active nests on refuge lands.

B. Complete the following table:

SPECIES/CRITICAL HABITAT	STATUS ¹
Bald Eagle	T

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

VI. Location (attach map):

- A. Ecoregion Number and Name:** No. 27, Lower Mississippi River
- B. County and State:** Haywood County, Tennessee
- C. Latitude and longitude:**
- D. Distance (miles) and direction to nearest town:** Approximately 4 miles south of Brownsville, Tennessee.
- E. Species/habitat occurrence:**

Bald eagles occur on the refuge during winter months. No active nests are known to exist on refuge lands.

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
Bald Eagle	No negative impacts foreseen; more protection.

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

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
Bald Eagle	Maintain and expand potential nesting and feeding habitat.

VIII. Effect Determination and Response Requested:

SPECIES/ CRITICAL HABITAT	DETERMINATION ¹			RESPONSE ¹ REQUESTED
	NE	NA	AA	
Bald Eagle		X		Concurrence

¹DETERMINATION/RESPONSE REQUESTED:

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a "Concurrence" is recommended for a complete Administrative Record.

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a "Concurrence".

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested for listed species is "Formal Consultation". Response Requested for proposed or candidate species is "Conference".

Signature (originating station)

Date

Title

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence _____ Nonconcurrence _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

Signature

Date

Title

Office

DRAFT COMPATIBILITY DETERMINATIONS

COMPATIBILITY DETERMINATIONS FOR HATCHIE NATIONAL WILDLIFE REFUGE

This set of compatibility determinations describes the wildlife-dependent and other uses included under the proposed alternative (Alternative D), as described in the Comprehensive Conservation Plan for Hatchie National Wildlife Refuge. It determines the conditions under which each use is considered compatible with the purposes, vision, and goals of the refuge and the mission of the National Wildlife Refuge System.

Under the National Wildlife Refuge System Administration Act of 1966, the Refuge Recreation Act of 1962, the National Wildlife Refuge System Improvement Act of 1997, and agency policy, the Service may not permit recreational uses on a national wildlife refuge unless those uses are first determined to be compatible wildlife-dependent uses. The needs of fish, wildlife, and plant resources on national wildlife refuges come first. All public uses must be compatible with these resources. A use is compatible if it is determined that the activity does not materially interfere with, or detract from, the fulfillment of the National Wildlife Refuge System mission or the purposes of the refuge. Furthermore, compatible activities, which depend on healthy fish and wildlife populations, will be recognized as priority public uses. The 1997 law established the priority public uses to be: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Refuge Uses: The following uses were evaluated to determine their compatibility with the Refuge System mission and the purposes of the refuge: 1) Hunting; 2) Recreational Fishing; 3) Wildlife Observation and Photography; 4) Environmental Education and Interpretation; 5) Cooperative Farming; 6) Raccoon Dog Field Trials; 7) Firewood Cutting (personal); 8) Non-motorized Boating; 9) Hiking, Jogging, and Walking; 10) Horseback Riding; 11) Off-Road Vehicles (Handicapped Use Only); 12) Bicycling; 13) Forest Management; and 14) Resource Research Studies

Refuge Name: Hatchie National Wildlife Refuge

County: Haywood, Tennessee

Establishing and Acquisition Authority:

Migratory Bird Conservation Act

Refuge Purpose(s):

“...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” 16 U.S.C. § 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

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

Compatibility determinations for each description listed were considered separately. For brevity, the preceding sections from "Refuge Uses" through "National Wildlife Refuge System Mission" are only written once within this Comprehensive Conservation Plan for Hatchie National Wildlife Refuge, they are part of each descriptive use and become part of that compatibility determination, if considered individually or outside of the plan.

Use: Hunting

Description of Use:

What is the use? Is the use a priority public use?

Hunting has been permitted as a compatible public use activity on Hatchie Refuge since acquisition. Hunting is a priority public use for the Service. The original Hunt Plan was completed, reviewed by the public, and approved in 1981. A revised Hunt Plan (2003) supercedes the original document and subsequent revisions. Refuge hunting seasons generally coincide with State of Tennessee hunting seasons and require only minor changes annually. Portions of the refuge are closed annually to all activity, including hunting, to protect migratory waterfowl wintering on the refuge, and overlapping hunting seasons may be limited to reduce conflicts, and/or prevent safety hazards. Turkey hunting, due to limited populations and extensive interest, is permitted only through limited "quota" drawings. All other hunting activities are permitted with a valid refuge hunt permit, and appropriate state licenses. The refuge hunts have been a great wildlife management and public relations tool by providing quality recreational opportunities for the general public, while regulating specific animal populations at desired levels.

The refuge Hunt Plan was developed to ensure that the associated public recreation and wildlife management objectives are met in a responsible and consistent manner by means that are compatible with the purposes for which the refuge was established. Service policy concerning hunting on national wildlife refuges, as recorded in the Refuge Manual, Section 8 RM 5.1, states: "The Secretary of the Interior is authorized by the National Wildlife Refuge System Administration Act of 1966, as amended, and the Refuge Recreation Act of 1962 to permit hunting on any refuge within the Refuge System upon a determination that hunting is compatible with the major purposes for which such areas were established."

Where would the use be conducted?

Hatchie Refuge is located in the western most portion of Tennessee along the Hatchie and Mississippi rivers. Bottomland hardwood forests dominate the refuge, interspersed with managed moist-soil impoundments, and agricultural fields. The entire refuge is open to hunting activities during all or part of the hunting seasons, with the exception of administrative sites. Portions of the refuge area closed seasonally to all public access to provide sanctuary for wintering migratory birds.

When would the use be conducted?

All hunting seasons are established annually through coordination with the Tennessee Wildlife Resources Agency.

A. Squirrel season dates and bag limits coincide with State seasons and regulations, except the season is closed during open archery and gun deer hunts. There is no spring squirrel season on the refuge.

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- B. Raccoon season dates and bag limits coincide with State season and regulations, except the season is closed during any deer hunt including the Friday night before the Saturday morning opening of the deer hunt.
 - C. Quail season dates and bag limits coincide with State season and regulations, except the season is closed during open archery and gun deer hunts.
 - D. Rabbit season dates and bag limits coincide with State season and regulations, except the season is closed during open archery and gun deer hunts.
 - E. Opossum season dates and bag limits coincide with State season and regulations.
 - F. Deer hunting on the refuge runs concurrently with State seasons and bag limits. The deer hunts are conducted to maximize hunter utilization and minimize disturbance to wintering waterfowl. All deer harvested during the gun hunt are bonus deer as established by the Tennessee Wildlife Resources Agency.
 - H. Turkey season coincides with the dates of the State season. The bag limit is one gobbler per hunter.
 - I. Waterfowl season dates and bag limits coincide with State seasons, except legal shooting hours are 30 minutes before sunrise to 12:00 noon.

How would the use be conducted?

All hunting activities on the refuge are subject to refuge-specific regulations published annually in the *Federal Register* and in the refuge public use brochure/permit, as well as regulations published by the State of Tennessee. Where these regulations differ, the refuge regulations shall supersede those published by the Tennessee Wildlife Resources Agency.

Why is this use being proposed?

Public hunting opportunities in west Tennessee are limited, with Service-managed refuges and State-managed wildlife management areas representing virtually all the public lands open to hunting. Private lands offer hunting opportunities only to those willing and able to purchase hunting rights through long-term leases or private ownership. The demand for public hunting areas is increasing at an alarming rate as we shift towards a more urbanized society, and refuges are expected to meet an ever increasingly important part of this demand.

Availability of Resources:

Resources involved in the administration and management of the use: Funding for the hunting program is borne by annual operation and maintenance funds, which support activities involving the public, such as recreation, interpretation, environmental education, hunting, and fishing. The cost of operating and maintaining the present upland game and big game hunts and a wild turkey season would be approximately \$8,000 annually. Within the annual refuge budget of approximately \$300,000, the necessary funds are available for administration of the hunting program. Therefore, the program is in compliance with specific funding portions of the Refuge Recreation Act.

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: Road Maintenance - \$3,000; Kiosks - \$100; Parking areas and boat ramps - \$1,000; Signs - \$250

Monitoring costs: Monitoring - \$1,000

Offsetting revenues: The refuge is a participant in the Recreational Fee Demonstration Project, which currently returns 80 percent of fees generated from recreational activities back to the refuge. At current levels, this provides approximately \$4,500 to the refuge to provide hunting opportunities.

Anticipated Impacts of the Use:

Short-term impacts: Hatchie Refuge has been open to small game hunting since 1964, and to deer hunting since 1977, with no documented disturbance to refuge habitats, and no noticeable impact on the abundance of species hunted or other associated wildlife. In fact, quite the opposite has been realized for all species except the wild turkey, whose numbers fluctuate with flooding conditions associated with the Hatchie River. Managed hunting opportunities may result in localized disruption of individual animals' daily routines, but no noticeable effect on populations has been documented. The maintenance of the refuge sanctuary provides ample space for a variety of wildlife species, including the threatened bald eagle, to utilize the refuge during critical periods without disturbance. Restrictions within the hunt program reduce overlapping seasons, which could potentially present public safety concerns.

Long-term impacts: There has been substantial historical use of this forested wetland area for hunting. Based on available information, there is no indication of adverse biological impacts associated with these activities. The refuge has the latitude to adjust hunting seasons and bag limits annually, or even close the refuge entirely due to safety or habitat condition concerns. With this latitude, coupled with monitoring of wildlife populations and habitat conditions by both the State and the Service, long-term impacts to either wildlife populations or habitats on the refuge are unlikely. As hunting pressure increases on the refuge, alternatives, such as limited quota hunts, can be utilized to limit impacts, as well as expanded sanctuaries to provide additional critical habitats for trust species, and/or threatened and endangered species

Cumulative impacts: Timing and duration of the refuge's hunt program does not coincide with other popular programs on the refuge and would not result in cumulative impacts to refuge resources.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Hunting seasons and bag limits are established annually, and generally fall within the state framework for Tennessee, as agreed upon during annual hunt coordination meetings with state personnel. The refuge has the ability to establish more restrictive seasons and bag limits to prevent over-harvest of individual species on the refuge. All hunters are required to possess a free, refuge hunting brochure/permit, or quota permit while participating in refuge hunts. Steel shot is required for all persons using shotguns while hunting on the refuge. All other refuge regulations apply. Law enforcement patrols are conducted throughout the hunt seasons to ensure compliance with refuge laws and regulations. Waterfowl hunting is limited to 1/2 day. No hunting or access is allowed in the waterfowl sanctuary areas from November 15 to March 15.

With the recent changes in the national law enforcement program and to ensure long term compatibility, the RONS project for a full-time law enforcement officer needs to be funded.

Justification:

A primary objective of the refuge is to provide the public with wildlife-dependent recreation. Hunting, which adheres to the refuge regulations, is an activity that is compatible with the purpose. Hunting is a viable management tool for controlling populations, especially that of deer and raccoons. Allowing this use to continue is consistent with the refuge's establishing purpose and management objectives, and follows current Service policy.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date:_____

Use: Recreational Fishing

Description of Use:

What is the use? Is the use a priority public use?

Fishing was a traditional recreational use of the refuge prior to its inclusion to the National Wildlife Refuge System and continues to be a popular recreational pursuit with the public. Fishing is a priority public use for the Service. The refuge will continue to provide public fishing opportunities in a region that is lacking sufficient amounts of acreage open to the public, and current fish populations will continue to support a sustainable harvest under a regulated fishing program. Fishing is limited to the Hatchie River, streams, sloughs, refuge lakes, and ponds. Catfish, bluegill, crappie, white bass, and largemouth bass comprise the most sought after fish species on the refuge.

Where would the use be conducted?

Hatchie Refuge currently contains 11,556 acres. The refuge protects the remaining bottomland hardwoods in the lower reaches of the Hatchie River. The refuge is important because it lies along the Hatchie River and contains ecotypes that support many wetland-dependent species. In addition, the Hatchie River is one of the largest unchannelized, free flowing rivers in the Lower Mississippi Valley. The refuge contains streams, oxbow lakes, constructed lakes, and borrow pit type lakes, which are available for fishing.

When would the use be conducted?

Fishing is open year-round, with the exception of the waterfowl sanctuary, which is closed to all public access from November 15 - March 15.

How would the use be conducted?

Fishing is conducted on Hatchie Refuge subject to seasons and regulations established by the Tennessee Wildlife Resources Agency. Fishing is further restricted on the refuge by special refuge regulations, which limit access to established boat ramps, prohibits access after dark, prohibits the use of certain fishing methods, and prohibits the taking of frogs and turtles. Seasonal closures are enforced for the benefit of wintering waterfowl and other trust species.

Several special fishing events are held annually and sponsored by the Haywood County Bass Club, including events for senior citizens, anglers with disabilities, and youth.

Why is this use being proposed?

While ample fishing opportunities exist in west Tennessee, the refuge affords visitors unique access to a portion of the largest unchannelized stream in west Tennessee, as well as several relatively undisturbed oxbow lakes adjacent to the river.

Availability of Resources:

Resources involved in the administration and management of the use: Funding for the fishing program is borne by annual operation and maintenance funds, which include activities involving the public, such as recreation, interpretation, environmental education, and conduct of refuge hunting and fishing programs. The refuge spends approximately \$5,000 of an annual refuge budget of

approximately \$300,000 in direct support of the fishing program. Therefore, the program is in compliance with specific funding portions of the Refuge Recreation Act.

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: Annual maintenance of existing boat ramps - \$200; Annual maintenance of existing parking areas - \$250; Annual maintenance of existing roads - \$500

Monitoring costs: \$1,000

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts: Minor impacts, such as littering and gasoline contamination, would occur but not at a level that would cause great concern. Historically, fishing has been one of the most prominent activities on the refuge, and has resulted in only temporary disturbance to refuge habitats and wildlife populations, causing no noticeable impact on the abundance of species sought or other wildlife affected by angler disturbance. Seasonal closure of sanctuary areas virtually eliminates any impacts of sport fishing during critical periods on wintering trust species.

Long-term impacts: No long term impacts are expected.

Cumulative impacts: No known cumulative impacts are known to occur.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Refuge fishing seasons are set within the constraints permitted by the State of Tennessee and participants must comply with State fishing and boating regulations. Law enforcement efforts would be directed at ensuring compliance with State and refuge regulations. Boat launching is allowed at ramps located at each lake (except Goose Lake, which is for bank fishing only) and two access points to the Hatchie River. All public access is prohibited from November 15 to March 15 in the waterfowl sanctuary. Only trolling motors are allowed. Gasoline engines are allowed to be left on the boat, but their use is prohibited. Possession or use of trot lines, limb lines, jug lines, yo-yo's, nets, and associated equipment is prohibited. The taking of frogs and turtles is prohibited.

Justification:

Historically, fishing has been one of the most prominent activities on the refuge, resulting in only temporary disturbance to refuge habitats and wildlife populations. It has caused no noticeable impact on the abundance of species sought or other wildlife affected by angler disturbance. Current regulations and restrictions limit the impacts to trust species, and provide a safe and rewarding experience for the refuge visitor. Therefore, the fishing program is compatible with the purposes for which the refuge was established and is in compliance with the National Wildlife Refuge System Act, the Refuge Recreation Act, and the Refuge Improvement Act of 1997.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: _____

Use: Wildlife Observation and Photography

Description of Use:

What is the use? Is the use a priority public use?

Wildlife Observation and Photography activities are priority uses of the refuge.

Where will the use be conducted?

Hatchie Refuge is open to public use year-round except for areas that are designated as the waterfowl sanctuary, which are closed from November 15 through March 15. Much of the refuge is subject to flooding, which may result in parts or all of the refuge being closed for safety reasons. Motorized vehicles must remain on designated gravel roads within the refuge.

When would the use be conducted?

The refuge is open to these activities year-round, except that portions of the refuge are closed from November 15 through March 15.

How would the use be conducted?

Most of the recreational activities on the refuge are centered on wildlife viewing, which is conducted on refuge roads.

Why is this use being proposed?

Providing the public with wildlife oriented recreation is one of the priority uses on the refuge. Wildlife observation and photography are very popular activities in the surrounding area, and the refuge is one component in a complex of public lands that lie in west Tennessee.

Availability of Resources:

Resources involved in the administration and management of the use: Funding for these programs is borne by annual operation and maintenance funds, which include activities involving the public such as recreation, interpretation, environmental education, and conduct of refuge hunting and fishing programs. The refuge spends approximately \$3,000 of an annual refuge budget of approximately \$300,000 in direct support of these programs. Therefore, the program is in compliance with specific funding portions of the Refuge Recreation Act.

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: Maintenance costs are not directly attributable to these incidental uses on the refuge.

Monitoring costs: None

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts: Most of the impacts would involve some violation of refuge regulations, such as deliberate disturbance of wildlife or plants, littering, or vandalism. Some animals are killed or injured by vehicles while crossing refuge roads. Disturbance to trust species during critical wintering periods is avoided by seasonal closure of sanctuary areas. Short-term impacts to facilities, such as roads and structures, could be avoided by special closures due to unsafe conditions.

Long-term impacts: No long-term negative impacts are anticipated.

Cumulative: No cumulative negative impacts are anticipated; however, programs may be modified in the future to mitigate unforeseen impacts.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Law enforcement patrolling of public use areas should continue to minimize violations. The current regulation that prohibits entry after daylight hours would be maintained. All seasonal closures are designed to coincide with peak waterfowl use periods. Any major change in waterfowl usage patterns that creates a conflict with public use would prompt further consideration of refuge regulations. Expansion of wildlife viewing opportunities beyond the current level may be explored if additional lands are ever acquired.

Justification:

A primary objective for which the refuge was established is to provide the public with wildlife oriented recreational opportunities. Wildlife observation and wildlife photography at the refuge, which adhere to established regulations, are activities that are compatible with that purpose.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: _____

Use: Environmental Education and Interpretation

Description of Use:

What is the use? Is the use a priority public use?

Activities would include traditional environmental education, such as teacher-led or staff-led, on-site field trips, off-site programs in classrooms, nature study, such as teacher and student workshops, and interpretation of the wildlife resources incorporated in support of facilities, such as interpretive trails, kiosks, and visitor contact station. These activities are priority public uses within the Service and seek to increase knowledge and understanding of wildlife and contribute to the conservation of such wildlife.

Where would the use be conducted?

The entire refuge has the potential to be utilized for environmental education and interpretation.

When would the use be conducted?

This is a year-round activity, conducted on an as-requested basis. Although this activity does not require a special use permit, it is most often closely coordinated with the refuge manager. Opportunities for classroom activities on those portions open to the general public, which do not violate general refuge regulations, may be conducted without coordination with the refuge manager.

How would the use be conducted?

The refuge would serve as an outdoor classroom for a variety of audiences with an interest in wildlife conservation and management. Typically, teachers, students, and other groups would learn from hands-on demonstrations, projects, and activities delivered by refuge staff. Activities would be conducted on site, utilizing existing refuge facilities. Group size would typically be limited to ensure effective presentation of desired materials, which may be specifically tailored to meet the educational needs of the group.

Why is this use being proposed?

Environmental education is utilized to encourage citizens of all ages to develop a land ethic. It is used to foster public support, increase visibility, and improve the image of the Service.

Availability of Resources:

Resources involved in the administration and management of the use: Currently, activities are conducted as time and resources permit. Increasing the number of volunteers on the refuge would provide for the further development of this program.

Facilities (including kiosks, interpretive signs and brochures, visitor contact station): \$1,000
On-site activities: \$200

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs:

- Kiosk maintenance and annual upgrades \$500

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- Signs maintenance and replacement \$500
 - Grounds maintenance and debris removal \$200

Monitoring costs: None

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts: The use of on-site, hands on, action-oriented activities by groups of teachers/students to accomplish environmental education objectives may impose a low level impact on the sites used for these activities. Impacts may include trampling of vegetation and temporary disturbance to wildlife species in the immediate vicinity during such activities. It is not anticipated that such impacts would be permanent.

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

Cumulative impacts: No negative cumulative impacts are anticipated.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

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

Justification:

Environmental education is used to encourage citizens of all ages to act responsibly in protecting a healthy ecosystem. It is a tool to use in building the land ethic, developing support for the refuge, and decreasing wildlife violations. It constitutes one method of increasing visibility in the community and improving the image of the Service. Environmental education at the refuge is incidental since full-time staff to conduct activities has only recently been added. However, the program is important and provides visitors with an awareness of refuge-specific issues, such as wetland ecology, endangered species protection, and migratory bird management, as well as issues relating to the entire refuge system. Environmental education activities are expected to increase while ensuring compatibility with the purpose for which the refuge was established.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: _____

Use: Cooperative Farming

Description of Use:

What is the use? Is the use a priority public use?

Cooperative farming has been a management tool on Hatchie Refuge since 1982. Primarily serving as a supplement to natural food resources, this program is designed to assist the refuge in meeting wintering waterfowl population goals. Contracts with cooperative farmers are established annually prior to the planting season. These contracts describe the location and amount of acreage to be planted during the coming year. The contract is then signed by the cooperative farmer and the Service representative (refuge manager). Shares are acreage based with a 75 percent cooperators share and a 25 percent refuge share. The cooperator assumes responsibility for all associated costs for the crops raised. Modifications to the original contract may occur throughout the farming season with amendments agreed upon and signed by all parties involved. In addition to providing winter food resources, this program may be utilized to maintain newly acquired tracts of land in an open condition until permanent natural habitat communities can be established. Farming is used to compliment natural food production on the refuge and assist in meeting the minimum waterfowl maintenance objectives of 5.5 million use days. Providing wintering and migrating habitat can be achieved in part through a successful cropland program. By incorporating a system of impoundments with the cropland program, the waterfowl maintenance objectives should be easily achieved. Preferred waterfowl crops include corn, milo, millet, wheat, buckwheat, and natural (moist-soil) foods. By planting crops, such as corn or millet in impoundment areas, their availability to waterfowl can be enhanced through flooding in the fall/winter.

Where would the use be conducted?

Cooperative farming is primarily utilized within the waterfowl sanctuary to provide for the needs of wintering waterfowl species without subjecting them to hunting pressure. Newly acquired tracts outside the existing waterfowl sanctuary may be farmed in preparation for the establishment of native habitats.

When would the use be conducted?

Cooperative farming contracts are generally valid from March 15-November 15 annually.

How would the use be conducted?

This activity is a contracted activity, with the cooperator providing all materials, equipment, and labor to fulfill the requirements of the contract. Facilities, such as roads and access points, are maintained by refuge staff.

Why is this use being proposed?

This use is deemed necessary to fulfill refuge obligations to provide for the wintering needs of waterfowl. While agricultural lands are abundant off the refuge, they do not provide a secure habitat for wintering waterfowl.

Availability of Resources:

Resources involved in the administration and management of the use: The refuge currently spends approximately \$8,000 per year in the administration of the refuge cooperative farming program. The

cost of providing the same resources for waterfowl utilizing refuge staff and equipment would cost approximately \$50,000 per year.

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: Maintenance of roads, trails, and access points for cooperative farmers: \$3,000 (this maintenance also benefits numerous refuge conducted activities).

Monitoring costs: Monitoring cooperative contacts, and cooperator activities: \$2,500
Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts: Soil disturbance is likely to occur when the areas are disked during spring planting season, but these impacts can be lessened by the implementation of no-till and conservation tillage farming methods. Buffer strips adjacent to waterway, and sensitive areas help trap sediments and hold agricultural run-off.

Monotypic stands of agricultural crops reduce the diversity and suitability of refuge lands for a variety of migratory and resident wildlife species.

Long-term impacts: None.

Cumulative impacts: The cumulative impacts should be minimal if integrated pest management practices and conditions within the cooperative agreement are followed.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Cooperative farming agreements, which are contractual agreements between the refuge and local farmers, require that special conditions be met. Cooperators are subject to dismissal for not meeting those conditions. Integrated pest management, administered by the refuge and implemented by cooperators, helps to reduce the potential for chemical misuse. See the Habitat Management Plan for a list of special conditions.

Justification:

Section 6 RM 4.1 of the National Wildlife Refuge System (NWRS) Refuge Manual states, "Service policy is to use the most natural means available to meet wildlife objectives. In situations where objectives cannot be met through maintenance of natural ecosystems, more intensive and artificial methods of cropland management may be employed. The acreage devoted to croplands will be that required to meet minimum habitat objectives."

The specific objective is stated as follows: To provide wintering waterfowl habitat for: Ducks - 5.5 million use days and 500 Geese. Although cropland management will be directed primarily to satisfy certain habitat and life requirements of waterfowl, other bird and mammal species will also benefit.

The production of crops is essential for waterfowl management to meet the primary objectives for which the refuge was established. Farming is an essential management tool for providing "hot" foods for migratory birds.

How did this economic use of refuge natural resources contribute to the purposes of the refuge or the mission of the National Wildlife Refuge System?

The Habitat Management Plan addresses the management of the refuge farm fields. These fields are farmed by a cooperator under a contractual agreement, issued annually, with the refuge. Under this agreement, the refuge receives a 25 percent share of each cooperative farmer's allotment where one acre out of four is planted for waterfowl food production. For their share (75 percent), the cooperative farmers plant primarily soybeans.

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

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

Mandatory 10- or 15-Year Re-evaluation Date: _____

Use: Raccoon Dog Field Trials

Description of Use:

What is the use? Is the use a priority public use?

AKC sanctioned and non-sanctioned raccoon dog field trials held by local hunters and raccoon hunting clubs.

Where would the use be conducted?

These activities would occur primarily on the forested areas of the refuge.

When would the use be conducted?

Hunts are conducted during the mid- to late-summer months, typically 2 to 3 months prior to raccoon season, and occur for 2-3 consecutive nights.

Availability of Resources:

Resources involved in the administration and management of the use: Funding for these programs is borne by annual operation and maintenance funds, which include activities involving the public, such as recreation, interpretation, environmental education, and hunting and fishing programs. The refuge spends approximately \$3,000 of an annual refuge budget of approximately \$300,000 in direct support of these programs. Therefore, the program is in compliance with specific funding portions of the Refuge Recreation Act.

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: Maintenance costs are not directly attributable to these incidental uses on the refuge.

Monitoring costs: None

Offsetting revenues: None

Anticipated Impacts of the Use:

Most of the impacts would involve some violation of refuge regulations, such as deliberate destruction of wildlife or plants, littering, and vandalism. Wildlife disturbance is a major factor during these activities. This disturbance stresses wildlife in the area, forcing changes in behavior and movements to other areas. Some animals are killed or injured by vehicles while crossing refuge roads.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

(There were none)

Justification:

A primary objective of the refuge is to provide the public with wildlife-oriented recreational opportunities. However, field trials can have detrimental effects on wildlife through increased disturbance. The activity also occurs at night and safety is a major concern. Other lands, both state and private, are available for this activity.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: _____

Use: Firewood Cutting (Personal)

Description of Use:

What is the use? Is the use a priority public use?

Collection and removal of residual wood (e.g., limbs, tree tops, and logs) left as a result of reserve timber harvests and stand thinnings by private individuals for personal home heating. This is a secondary use of resources not suited for commercial harvest as prescribed by the Habitat Management Plan for timber stand improvements. This use is directly linked to management actions on the refuge and reserve harvests within limited blocks of timber. It is expected to be very limited due to availability of resources outside the refuge. As future developments diminish resources outside the refuge, the demand for utilization of refuge resources is expected to increase. This is not an economic use, rather an alternative to refuge-funded cleanup following timber management activities.

Where would the use be conducted?

Firewood cutting would be conducted in hardwood forests throughout the refuge following commercial harvest or thinning operations, as designated by the Habitat Management Plan and Annual Habitat Management Plan.

When would the use be conducted?

This activity would take place only when ground conditions exist that would limit disturbance and damage.

How would the use be conducted?

Individuals would apply for a special use permit for the collection of a limited amount of firewood for personal use to be harvested from selected areas on the refuge. Individual is responsible for his/her equipment, safety, and all aspects of the removal of firewood from the refuge.

Why is this use being proposed?

Firewood cutting is a management tool used to remove slash left by timber cutting operations. Firewood cutting reduces fuel loads associated with timber harvests and accelerates the response of shade-intolerant oak seedlings, for which the management is directed in the habitat management plan. While this opportunity exists outside the refuge, it is seen as an alternative to refuge funded cleanup following approved timber sales.

Availability of Resources:

Resources involved in the administration and management of the use: Administration and management are discussed in the Habitat Management Plan. Administrative costs are expected to be less than those associated with refuge cleanup on treatment areas, and are outlined in the Habitat Management Plan.

Permit application and issuance: \$25/permit

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: Signing designated access routes, and harvest areas: \$200/unit

Signs: \$125 (these signs would be utilized on multiple units for several years, and considered a one-time cost)

Monitoring costs: As this use is considered to be an accompanying use to commercial timber harvest activities on the refuge, all monitoring activities would be attributable to those commercial activities, as covered in the Habitat Management Plan.

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts: No negative short-term impacts are expected. Firewood cutting occurs immediately after contractor has vacated a harvest compartment so no new disturbance of plants or wildlife would occur. Removal of debris and trees accelerates opening of the forest floor for oak regeneration, as well as reducing potential fuel loads within the harvest compartment. Permits set specific conditions and locations to minimize impacts.

Long-term impacts: This activity would potentially provide positive long-term impacts through the accelerated release of hardwood species thus creating diverse vertical structure within the management unit. It would also reduce ground litter and debris often associated with managed timber harvest.

Cumulative impacts: No cumulative impacts are anticipated.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Firewood cutting is administered by refuge personnel through special use permits and is allowed in designated areas only. Failure to meet the conditions of the special use permit constitutes a violation of the Refuge Administration Act whereby the permittee is subject to termination of the permit and issuance of a Notice of Violation.

Justification:

Personal firewood cutting is compatible with the purposes for which the refuge was established. It is an effective way to remove slash left by timber cutting operations, and accelerates the growth of shade-intolerant oak seedlings for which the management is directed in the Habitat Management Plan.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: _____

Use: Non-motorized Boating

Description of Use:

What is the use? Is the use a priority public use?

Non-motorized boating is a minor use of the refuge. Although this use is not a priority use, it is often associated with the priority uses, such as fishing and wildlife observation.

Where would the use be conducted?

Hatchie Refuge is open to public use year-round except for areas that are designated as waterfowl sanctuaries, which are closed from November 15 through March 15. Much of the refuge is subject to flooding, which may result in parts or all of the refuge being closed for safety reasons.

When would the use be conducted?

The refuge is open to these activities year-round, except that portions of the refuge are closed from November 15 through March 15.

How would the use be conducted?

This use is centered around fishing and wildlife observation.

Why is this use being proposed?

Providing the public with wildlife-oriented recreation is one of the priority uses on the refuge. Non-motorized boats are very popular in the surrounding area, and the refuge is one component in a complex of public lands that lie in west Tennessee.

Availability of Resources:

Resources involved in the administration and management of the use: Funding for these programs is borne by annual operation and maintenance funds, which include activities involving the public, such as recreation, interpretation, environmental education, and conduct of refuge hunting and fishing programs. The refuge spends approximately \$3,000 of an annual refuge budget of approximately \$300,000 in direct support of these programs. Therefore, the program is in compliance with specific funding portions of the Refuge Recreation Act.

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: Maintenance costs are not directly attributable to these incidental uses on the refuge.

Monitoring costs: None

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts: Most of the impacts would involve some violation of refuge regulations, such as deliberate disturbance of wildlife or plants, littering, and vandalism. Some animals are killed or

injured by vehicles while crossing refuge roads. Disturbance of trust species during critical wintering periods is avoided by seasonal closure of sanctuary areas. Short-term impacts to facilities, such as roads and structures, can be avoided by special closures due to unsafe conditions.

Long-term impacts: No long-term negative impacts are anticipated.

Cumulative impacts: No cumulative negative impacts are anticipated, however, programs may be modified in the future to mitigate unforeseen impacts.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Law enforcement patrolling of public use areas should continue to minimize violations. The current regulation that prohibits entry after daylight hours would be maintained. All seasonal closures are designed to coincide with peak waterfowl use periods. Any major change in waterfowl usage patterns that creates a conflict with public use would prompt further consideration of refuge regulations.

Justification:

A primary objective for which the refuge was established is to provide the public with wildlife-oriented recreational opportunities. Non-motorized boating at the refuge, which adheres to the established regulations, is an activity that is compatible with that purpose.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: _____

Use: Hiking, Jogging, and Walking

Description of Use:

What is the use? Is the use a priority public use?

Hiking, jogging, and walking activities are minor uses, which occur on the refuge. Although they are not priority public uses, they can be associated with several priority uses.

Where would the use be conducted?

Hatchie Refuge is open to public use year-round except for areas on the refuge that are designated as the waterfowl sanctuary, which are closed from November 15 through March 15. Much of the refuge is subject to flooding, which may result in parts or all of the refuge being closed for safety reasons.

When would the use be conducted?

The refuge is open to these activities year-round, except that portions of the refuge are closed from November 15 through March 15.

How would the use be conducted?

Most of the recreational activities on the refuge are centered on wildlife viewing, which is conducted on refuge roads and trails. Hiking, jogging, and walking occur on refuge roads and trails that are open to such activities.

Why is this use being proposed?

Providing the public with wildlife-oriented recreation is one of the priority uses on the refuge. Hiking, jogging, and walking are very popular activities in the surrounding area, and the refuge is one component in a complex of public lands that lie in west Tennessee.

Availability of Resources:

Resources involved in the administration and management of the use: Funding for these programs is borne by annual operation and maintenance funds, which include activities involving the public, such as recreation, interpretation, environmental education, and conduct of refuge hunting and fishing programs. The refuge spends approximately \$3,000 of an annual refuge budget of approximately \$300,000 in direct support of these programs. Therefore, the program is in compliance with specific funding portions of the Refuge Recreation Act.

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: Maintenance costs are not directly attributable to these incidental uses on the refuge.

Monitoring costs: None

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts: Most of the impacts would involve some violation of refuge regulations, such as deliberate disturbance of wildlife or plants, littering, and vandalism. Disturbance to trust species during critical wintering periods is avoided by seasonal closure of sanctuary areas. Short-term impacts to facilities, such as roads and structures, could be avoided by special closures due to unsafe conditions.

Long-term impacts: No long-term negative impacts are anticipated.

Cumulative impacts: No cumulative negative impacts are anticipated; however, programs may be modified in the future to mitigate unforeseen impacts.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Law enforcement patrolling of public use areas should continue to minimize violations. The current regulation that prohibits entry after daylight hours would be maintained. All seasonal closures are designed to coincide with peak waterfowl use periods. Any major change in waterfowl usage patterns that creates a conflict with public use would prompt further consideration of refuge regulations. Expansion of wildlife viewing opportunities beyond the current level may be explored with the acquisition of additional lands.

Justification:

A primary objective of the refuge is to provide the public with wildlife-oriented recreational opportunities. Jogging, walking, and hiking at the refuge, which adhere to the established regulations, are activities that are compatible with that purpose.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: _____

Use: Horseback Riding

Description of Use:

What is the use? Is the use a priority public use?

Horseback riding on established roads within Hatchie Refuge. While not one of the six priority public uses, it is often associated with them.

Where would the use be conducted?

Horseback riding would be permitted on refuge roads and trails open to public vehicles.

When would the use be conducted?

Horseback riding would be permitted year-round during daylight hours only, on roads open to the public. Areas closed to the general public for management or safety purposes would be closed to horseback riding as well.

How would the use be conducted?

Horseback riding would be a self-initiated activity on the refuge, with no amenities provided specifically for this activity. Participants of this activity would be responsible for all aspects of their visit and use of the refuge.

Why is this use being proposed?

This is a popular activity, which has historically occurred on lands that are now refuge lands within west Tennessee. Development and paving of most of the roads in west Tennessee have significantly decreased the amount of gravel roads available for horseback riding.

Availability of Resources:

Resources involved in the administration and management of the use: No additional administrative costs are associated with this activity.

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: None

Monitoring costs: None

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts: No impacts are expected.

Long-term impacts: No long term impacts are expected.

Cumulative impacts: No cumulative impacts are expected.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Horseback riding would be limited to daylight hours only. Horseback riding would be restricted to graveled public roads open to vehicle traffic.

Justification:

Horseback riding supports wildlife observation by providing an alternative mode of travel on refuge roads.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: _____

Use: Off Road Vehicles (handicapped use only)

Description of Use:

What is the use? Is the use a priority public use?

Use of off-road vehicles (e.g., 4-wheel all-terrain) by disabled hunters is essential in providing adequate hunting opportunities for these individuals. The difficult and often swampy terrain on the refuge makes individual use of ATV's the most cost effective method of providing access for disabled hunters. Use is restricted to transportation to and from designated hunting locations, including the transport of personal gear and game taken by the handicapped hunter. Carrying another person or their game is not permitted.

Where would the use be conducted?

This use would be allowed in designated areas open to hunting on the refuge.

When would the use be conducted?

Use is only allowed during established refuge hunting seasons.

How would the use be conducted?

Access by disabled hunters is allowed on a case-by-case basis, with applicants providing necessary documentation of disability, request for areas to be accessed, and species sought. Currently, the refuge receives 3-5 requests annually from disabled hunters primarily seeking access for deer hunting. The hunters are responsible for providing all equipment and associated assistance during their hunt. This permit grants no other privileges other than access by ATV on designated trails on the refuge, and the permittee must comply with all other refuge and state hunting regulations.

Why is this use being proposed?

Disabled hunters routinely apply for a special use permit to participate in hunting programs currently offered on the refuge. While these opportunities currently exist on private lands and State wildlife management areas, the Service has an obligation to provide access to disabled hunters wishing to utilize the refuge.

Availability of Resources:

Resources involved in the administration and management of the use: Review and issuance of special use permits: \$50/permit

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: Several former timber haul roads will be utilized by disabled hunters. These roads are minimally maintained to support other recreational activities. No additional costs would be attributable to this program.

Monitoring costs:

All monitoring of this use would be conducted in conjunction with the refuge hunting program, and no additional costs would be attributed to this program.

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts: Impacts to wildlife, plants, and habitat by the use of off-road vehicles are well documented and some disturbance to wildlife, plants and their habitats is expected to occur. The impact to the refuge is anticipated to be negligible. However, this minor impact is acceptable in providing suitable access to disabled hunters who use all-terrain vehicles to access hunting opportunities on the refuge.

Long-term impacts: No long-term impacts are expected due to the short duration and limited scope of anticipated use.

Cumulative impacts: No cumulative impacts are anticipated with this use.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The refuge has established a policy for the level of disability that necessitates the use of off-road vehicles for hunting. Persons applying for disabled hunter status must possess written proof of disability from their physician, which is reviewed prior to issuance of a special use permit. All other refuge regulations apply.

Justification:

A primary objective of the refuge is to provide the public with wildlife-oriented recreation. Allowing handicapped hunters to use off-road vehicles to pursue their sport provides this group with no more opportunity than that afforded the general public. Provided this activity adheres to the refuge regulations, it is an activity that is compatible with refuge objectives.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: _____

Use: Bicycling

Description of Use:

What is the use? Is the use a priority public use?

Bicycling is a minor use of the refuge. Although it is not a priority use, it many times is associated with a priority use such as hunting.

Where will the use be conducted?

Hatchie Refuge is open to public use year-round except for areas that are designated as waterfowl sanctuaries and closed from November 15 through March 15. Much of the refuge is subject to flooding, which may result in parts or all of the refuge being closed for safety reasons. Bicycles are permitted only on open designated motorized vehicle routes and trails.

When would the use be conducted?

The refuge is open to these activities year-round, except that portions of the refuge that are closed from November 15 through March 15.

How would the use be conducted?

Most of the recreational activities on the refuge center on wildlife viewing, which is conducted on refuge roads and at the observation tower. Bicycling occurs on refuge roads and areas that are open to such activities.

Why is this use being proposed?

Providing the public with wildlife oriented recreation is one of the priority uses on the refuge. Bicycling is a very popular activity in the surrounding area, and the refuge is one component in a complex of public lands that lie in west Tennessee.

Availability of Resources:

Resources involved in the administration and management of the use: Funding is borne by annual operation and maintenance funds, which include activities involving the public such as recreation, interpretation, environmental education, and conduct of refuge hunting and fishing programs. The refuge spends approximately \$3,000 of an annual refuge budget of approximately \$300,000 in direct support of these programs. Therefore, the program is in compliance with specific funding portions of the Refuge Recreation Act.

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: Maintenance costs are not directly attributable to incidental uses on the refuge.

Monitoring costs: None

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts: Most of the impacts would involve some violation of refuge regulations, such as deliberate disturbance of wildlife or plants, littering, and vandalism. Disturbance of trust species during critical wintering periods is avoided by seasonal closure of sanctuary areas. Short-term impacts to facilities, such as roads and structures, can be avoided by special closures due to unsafe conditions.

Long-term impacts: No long-term negative impacts are anticipated.

Cumulative impacts: No cumulative negative impacts are anticipated; however, programs may be modified in the future to mitigate unforeseen impacts.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Law enforcement patrolling of public use areas should continue to minimize violations. The current regulation that prohibits entry after daylight hours would be maintained. All seasonal closures are designed to coincide with peak waterfowl use periods. Any major change in waterfowl usage patterns that creates a conflict with public use would prompt further consideration of refuge regulations.

Justification:

A primary objective for which the refuge was established was to provide the public with wildlife-oriented recreational opportunities. Bicycling at the refuge, which adheres to established regulations, is an activity that is compatible with that purpose.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: _____

Use: Forest Management

Description of Use:

What is the use? Is the use a priority public use?

The Forest Management objectives for the refuge are:

1. Maintain and enhance necessary habitat for threatened and endangered species by promoting plant communities beneficial to these species.
2. Manage forest stands to enhance waterfowl habitat by manipulating stand composition in order to produce high quality food and to provide adequate nesting areas. This would include promoting red oak and other favored tree species and by assuring that adequate den and snag trees remain in the stands.
3. Manipulate forest stands to provide diverse habitat for a wide variety of wildlife species present throughout the refuge by providing a variety of plant successional stages ranging from regeneration to mature timber.
4. Perform management actions that would compliment recreational and educational activities by carefully planning when and where management actions should take place.
5. Utilize management techniques, which do not adversely affect soils, water bodies, or any other natural resources present. These techniques should include harvesting under proper climatic conditions and placing buffer strips where necessary to protect water quality or other natural resources.

Various silvicultural treatments would be used to accomplish these forest management objectives. Silvicultural decisions would be based upon the favored wildlife species and their habitat requirements as they relate to the favored tree species outlined in the Habitat Management Plan. The refuge goal is to promote the favored tree species, which would meet the wildlife habitat requirements. Management must recognize the importance of these tree species and the special management considerations, which they must have, in order to assure that they remain a high percentage of the stand composition. Silvicultural decisions should consider the age and vigor of the existing stands and the availability of desirable reproduction. When harvesting timber, management would be concerned with the promotion of diverse, vigorous stands of timber, which benefit trust species. An important factor to consider when making silvicultural decisions is the availability of advanced red oak regeneration. After reviewing the data collected and surveying the refuge, there is a great concern about the future of red oak species on the refuge. Much time would be spent making timber cuts to aid the red oak reproduction and to promote it to an advanced stage so that it could be released. During the initial survey of the refuge, extensive data were collected concerning reproduction. These areas would receive high priority management attention. It is crucial that this reproduction be released to promote the growth of new stands with a relatively high red oak component. Various silvicultural treatments would be used to promote favored timber species. These treatments include intermediate cuttings, timber stand improvement, shelterwood, clearcut, and patch cuts.

Where would the use be conducted?

Hatchie Refuge currently consists of 11,556 acres of which 5,000+ acres contain bottomland hardwoods in the lower reaches of the Hatchie River. The refuge is important because it lies along the Hatchie River and contains ecotypes that support many wetland-dependent species.

When would the use be conducted?

Activities would be conducted during the driest months of the year, usually July through November.

How would the use be conducted?

Timber harvest operations would be conducted using local contractors who would bid on the timber to be harvested. Timber stand improvements would be conducted by the staff using a dozer with shearing blade or chemical injection of undesirable species.

Why is this use being proposed?

This use is being proposed by the refuge as a management tool, designed to improve habitat conditions on the refuge for trust species.

Availability of Resources:

Resources involved in the administration and management of the use: Complex forestry staff would spend an estimated 25 percent of their time at Hatchie Refuge. The Habitat Management Plan goes into sufficient detail regarding station resources needed to accomplish forest management activities.

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: All maintenance activities associated with commercial timber harvest would be carried out by the contractor. While this would reduce the payment to the government for the value of timber removed, no additional costs would be incurred by the refuge.

Monitoring costs: Monitoring of timber sales is an administrative function and all costs associated with this activity have been accounted for previously.

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts: Short-term impacts would vary with the scope of the timber harvest technique utilized. Thinning and timber stand improvement projects would result in very limited impacts to habitats, and virtually no impacts to trust species. Clearcuts and patch cutting would have moderate impacts to localized blocks of habitats, and may temporarily displace trust species.

Long-term impacts: Long term impacts would be beneficial for all timber harvest operations, as they are designed to improve habitat conditions over time for trust species. Benefits include, but are not limited to, increased vigor of key species, increased diversity both in structure and species composition of the forest habitats, and improved wildlife habitat.

Cumulative impacts: No negative cumulative impacts are expected as a result of timber management. Timber management, in concert with other refuge management activities, would greatly enhance the suitability of the various habitats on the refuge for a variety of wildlife species.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

All commercial activities would be conducted under the regulations set forth by Special Use permits. These regulations would follow all guidelines outlined in the Habitat Management Plan. Forest management activities would follow the Tennessee Forest Best Management Practices.

Justification:

The forest management program is compatible with the purposes for which the refuge was established and is in compliance with the National Wildlife Refuge System Act, the Refuge Recreation Act, and the Refuge Improvement Act of 1997. These activities also support the following plans: Partners-in-Flight, Lower Mississippi Joint Venture, and West Tennessee Wildlife Resource Conservation Plan.

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

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

Mandatory 10- or 15-Year Re-evaluation Date: _____

Use: Resource Research Studies

Description of Use:

What is the use? Is the use a priority public use?

This activity would allow university students and professors, non-governmental researchers, and governmental scientists access to the refuge's natural environment to conduct both short-term and long-term research projects. The outcome of this research would result in better knowledge of the refuge's natural resources and improved methods to manage, monitor, and protect them.

Where would the use be conducted?

This activity would be conducted throughout the refuge in a variety of habitat types. Activities carried out during approved research projects may be limited to avoid unnecessary disturbance to refuge resources.

When would the use be conducted?

These activities would vary in scope and duration, as needed, to satisfy the requirements of the research project. Projects may involve everything from limited one-time sampling to long-term study plots.

How would the use be conducted?

Research projects would be conducted by accredited universities, state and federal governmental representatives, and rarely by private individuals. The refuge would act solely in a supportive role, providing minimal assistance in most cases.

Why is this use being proposed?

Furthering the knowledge of the impacts and benefits of management decisions, life histories of wildlife species utilizing the refuge, and interrelationships of habitats and wildlife occurring on the refuge is crucial to the effective management of the refuge. The refuge provides secure sites for long-term evaluation of management actions, population trends, and ecological functions within the bottomland ecosystems in west Tennessee.

Availability of Resources:

Resources involved in the administration and management of the use: No additional fiscal resources are needed to conduct this use. Existing staff can administer permits and monitor use as part of routine management duties.

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: None

Monitoring costs: None

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts: There should be no significant negative impacts from scientific research on the refuge. The knowledge gained from the research would provide information to improve management techniques and better meet the needs of trust resource species. Impacts, such as trampling vegetation and temporary disturbance to wildlife, would occur but should not be significant. A small number of individual plants and animals may be collected for further study. These collections would have an insignificant effect on the refuge plant and animal populations.

Long-term impacts: Long-term benefits associated with improved management techniques developed through research would far outweigh any negative impacts which may occur.

Cumulative impacts: No negative cumulative effects are anticipated.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Each request for use of the refuge for research would be examined on its individual merit. Questions of who, what, when, where, and why, would be asked to determine if requested research would contribute to the refuge purposes and could best be conducted on the refuge without significantly affecting the resources. If so, the researcher would be issued a Special Use Permit. Progress would be monitored and the researcher would be required to submit annual progress reports and copies of all publications derived from the research.

Justification:

The benefits derived from sound research provide a better understanding of species and the environmental communities present on the refuge. These benefits far outweigh any short-term disturbance or loss of individual plant and animals that might occur.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: _____

Approval of Compatibility Determination

The signature of approval is for all compatibility determinations considered within the comprehensive conservation plan. If one of the described uses is considered for compatibility outside of the plan, the approval signature becomes part of that determination.

Refuge Manager:

(Signature/Date)

**Regional Compatibility
Coordinator:**

(Signature/Date)

Refuge Supervisor:

(Signature/Date)

**Regional Chief, National
Wildlife Refuge System,
Southeast Region:**

(Signature/Date)

Appendix VI: Management Methods and Procedures

PARTNERSHIPS

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

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

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

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

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

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

In addition to providing restoration assistance to private landowners, the Service also provides biological technical assistance to U.S. Department of Agriculture agencies implementing key conservation programs of the Farm Bill. The Service's assistance helps the Department of

Agriculture meet the technical challenges presented by these programs, while maximizing benefits to fish and wildlife resources. The Service also assists in on-the-ground habitat restoration actions associated with several of these programs.

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

AVIFAUNAL ANALYSIS

Wintering Waterfowl

The North American Waterfowl Management Plan (NAWMP) identified a continental waterfowl population goal of 62 million breeding ducks, goals for specific populations of geese, and the actions needed to achieve those goals. The NAWMP identified the Lower Mississippi Valley (LMV) as one of the priority habitat areas, and a plan of action for the LMV was implemented in 1990 to achieve NAWMP goals. The goal of the LMV Plan focused on providing an adequate quantity, quality, and distribution of habitats on public and private lands to ensure that the LMV could support a wintering population of at least 8.7 million ducks and 1.4 million geese. The geographic area covered by the West Tennessee Wildlife Resources Conservation Plan needs to provide an adequate quantity, quality, and distribution of habitats to support a wintering population of 599,000 ducks and 61,000 Canada geese. Achieving this goal will require maintaining the current 10,600 acres managed in west Tennessee for ducks and geese and developing a minimum of 6,300 additional acres of habitat with water management capability for ducks.

The West Tennessee Wildlife Resources Conservation Plan identified minimum waterfowl foraging objectives for the Obion, Forked Deer, and Hatchie/Wolf River Watersheds, along with strategies and actions designed to meet those needs. It should be recognized that providing adequate foraging habitats to support duck population objectives depends upon current habitat conditions and food availability, which vary annually. In some years, food resources will be abundant and readily available, but much less in other years. Therefore, management efforts should focus, at a minimum, on meeting foraging needs during critical periods. It was assumed that if adequate foraging habitats are available, other habitat types needed by waterfowl will also be adequate. Other life history needs related to sanctuary, water, cover, molting, pairing, etc., will be considered throughout the planning area, as well as species specific requirements such as nest and brood habitat for wood ducks.

Duck population and habitat carrying capacity goals for the West Tennessee Wildlife Resources Conservation Plan were stepped down from the Lower Mississippi Valley Joint Venture Plan (Loesch et al., 1994) that was developed to implement the NAWMP. Duck population goals were calculated using data from the Midwinter Waterfowl Inventory, county duck harvest estimates, and continental population goals. This method involves calculating the number of ducks that must winter in the West Tennessee Wildlife Resources Conservation Plan area if the NAWMP is to achieve the objective of a 62-million-average continental breeding population. The steps involved in making these calculations were described in the Lower Mississippi River Joint Venture Evaluation Plan. Other documents that provided guidance in formulating goals and objectives for the West Tennessee Wildlife Resources Conservation Plan were the Tennessee Wildlife Resources Strategic Plan for 2000-2006 and the Tennessee Implementation Plan for the NAWMP.

Guidelines from the West Tennessee Wildlife Resources Conservation Plan used in this plan included:

- The average number of geese counted during the January Mid-Winter Waterfowl Survey for the 1985-89 period was selected as the population goal for the WTWR Conservation Plan.
- Procedures used to calculate waterfowl objectives in the LMV (Loesch et al., 1994) were also used for the WTWR Conservation Plan. However, since calculated foraging objectives are considered to be the minimum needed and the Tennessee Wildlife Resource Agency's (TWRA) Strategic Plan calls for a 15 percent increase in populations and habitat, objectives were increased by 15 percent.

Under existing management, Hatchie Refuge provides 295 acres of managed impoundments, 634 of which are flooded. In addition, 100 acres of winter wheat or corn are planted annually on agricultural lands that surround the impoundments. According to objectives and strategies developed as part of the WTWR Conservation Plan, Lower Hatchie has target objectives of 5.4 million duck use days and 500,000 goose use days.

Transient Shorebirds

Habitat objectives (acres) derived from shorebird population estimates have been developed by the Mississippi Alluvial Valley Migratory Bird Initiative (MBI) and adopted by the US Shorebird Conservation Plan (USSCP). Whereas these acre objectives are useful in shorebird management, it is generally recognized that intensive management of smaller basins likely results in consistently greater carrying capacity for shorebirds than does less intensive management on extensive areas (Rohs Short 1999; USSCP 2000). This results mainly from the fact that optimal habitat conditions for shorebirds occupy a relatively narrow band in the water depth and vegetation density continuums. Providing mudflat/shallow water (i.e., < 2 in. water) conditions with < 25 percent vegetative cover over extensive areas is difficult under most management situations in west Tennessee, especially during the fall. As a result, the approach in developing the WTWR Conservation Plan is to not only identify areas potentially suitable for shorebird habitat management (i.e., acquisition and protection), but also to provide information necessary to manage effectively for shorebirds on existing and potential management areas. Note that this is in contrast to an approach of taking the existing acreage objective and stepping it down to various specific management units (e.g., wildlife management areas and refuges).

Stopover habitat during southward migration has been identified by the US Shorebird Conservation Plan as the critical factor for shorebird habitat management in the LMV region. Quality habitat for shorebirds during this portion of the annual cycle consists of shallow (0-2 in.) water with little standing vegetation (< 25 percent cover) from late July through October. Because this typically is a dry time of year in west Tennessee, sites that naturally hold water (i.e., low-lying sites with poorly drained, hydric soils) likely offer the most favorable conditions for effective wetland restoration and management.

Current public land habitat objectives for shorebirds in the MAV of Tennessee total 224 acres, whereas planned shorebird habitat acres total 230. In 1999, public managed areas within the MAV in west Tennessee provided 97 acres of habitat in the fall specifically for shorebirds (LMV Joint Venture Office, unpubl. data). Shorebird habitat goals for TWRA in fall 2000 for Eagle Lake, White Lake, and Reelfoot wildlife management areas were 90, 120, and 80, respectively, totaling 290 acres. This would have provided well over half of the MBI objective (457 acres). However, due to excessively dry conditions, these goals were not met. If properly managed, a small percentage of the areas identified as potentially suitable for shorebird habitat management in the WTWR Conservation Plan, plus the objective acreage on existing TWRA areas, would more than satisfy the MBI shorebird habitat objective for Tennessee. It should be noted little information is available on the importance of shorebird habitat or use within the EGCP.

Shorebird habitat is largely compatible with waterfowl habitat. Perhaps the most substantial difference between shorebird and waterfowl habitat management is the timing of prescribed actions. Fall shorebird migration occurs earlier than migration for most waterfowl species. However, managing for early fall migrant shorebirds will provide optimal habitat for southward-migrating blue-winged teal. Basins drawn down in late summer for shorebird habitat can be reflooded in November, making seeds in the substrate available to waterfowl. Additionally, shallow water habitat during late summer/early fall is beneficial to many species of wading birds, including herons, egrets, and bitterns.

Waterfowl and shorebirds also differ somewhat in their use of water depth. Generally, dabbling ducks use a wider range of water depths than shorebirds. Hence, maintaining shallow water (< 6 inches) accommodates both shorebirds and dabbling ducks, whereas deeper water (8-12 inches) excludes most of the shorebird species common to this region. Likewise, ducks tolerate a greater density of standing vegetation than shorebirds. Fortunately, reducing standing vegetation by disking in late summer/fall enhances benthic invertebrate density, creates conditions suitable for shorebird use, and can increase seed density for waterfowl in the subsequent growing season (Gray et al., 1999). However, note that disking or mowing prior to October (as is recommended for some fall shorebird habitat scenarios) will reduce seed production by late seeding grasses, such as millet and panic grasses, which are heavily utilized by waterfowl. Managing multiple units under a variety of regimes will ensure that such loss of potential waterfowl food occurs on only a few units (< 2) in a given year.

Under existing management on Hatchie Refuge, approximately 100 acres are managed during the spring shorebird migration period, and approximately 10 to 20 acres are provided during the fall migration period.

Forest Breeding Birds

Habitat objectives for landbirds in the EGCP have been established by Partners-in-Flight in the East Gulf Coastal Plain Bird Conservation Plan (Woodrey et al., 1998). Swallow-tailed kite restoration, stable or increasing cerulean warbler populations and stable or increasing Swainson's warbler populations are the primary landbird goals in the MAV and EGCP Bird Conservation Plans. In order to meet the population objectives for these species, the EGCP plan has identified 13 Bird Conservation Areas, broken down into ten 10,000- to 20,000-acre blocks, and three 20,000 acres or greater blocks in west Tennessee. Two of the 20,000 acre blocks are located on the Hatchie River.

Bottomland hardwoods have been identified as the habitat of primary concern in the MAV and EGCP, with at least 70 species of landbirds occurring in this habitat type in the physiographic area (Twedt et al., 1998). The highest priority landbird species are the Swainson's warbler, cerulean warbler, and swallow-tailed kite, all of which occur in bottomland hardwood forests.

Approximately 253,864 acres of forested wetlands occur in tributaries to the Mississippi River in Tennessee's East Gulf Coastal Plain. Currently 19,588 acres occur on public lands outside the MAV. The forested wetland objective for west Tennessee's EGCP is 160,000 acres. An additional 140,412 acres are necessary to provide habitat for sustainable bird populations in forested wetlands.

A primary focus for the 20,000 acre blocks will be the cerulean warbler. Habitat increases and improvements of existing forested wetland acres should also impact other Partners-in-Flight priority species including Swainson's warbler, prothonotary warbler, Kentucky warbler, and yellow-billed cuckoo.

Under existing management, Hatchie Refuge provides approximately 9,764 managed acres of bottomland hardwood forest for landbirds and approximately 382 acres of upland forest.

Threatened and Endangered Bird Species

Part of the Service mission is to protect, enhance, and manage habitat for threatened and endangered species, in keeping with the enforcement of the Endangered Species Act. Two federally listed bird species known to use the Hatchie Refuge vicinity during at least part of their life cycle include the bald eagle and the interior least tern.

The bald eagle, a threatened species that the Service plans to de-list, winters in the Mississippi Alluvial Valley of Tennessee in large numbers. Nearby Reelfoot Lake has one of the largest overwintering populations in the lower 48 states. As many as 5 bald eagles have been known to occur in the Hatchie Refuge vicinity, but no active nests are known to exist on the refuge. While there has yet to be a documented nest on the refuge, the refuge's continuing habitat restoration and protection activities provide suitable habitat for nesting eagles. A Section 7 Intra-Service Biological Evaluation addressing this species is found in Appendix 5.

ARCHAEOLOGICAL AND HISTORIC RESOURCE PROTECTION

With the enactment of the Antiquities Act of 1906, the federal government recognized the importance of cultural resources to the national identity and sought to protect archaeological sites and historic structures on those lands owned, managed, or controlled by the United States.

The body of historic preservation laws has grown dramatically since 1906. Several themes are consistently present in the laws and the establishing regulations. They include: 1) each agency to systematically inventory the "historic sites" on their holdings and to scientifically assess each site's eligibility for the National Register of Historic Places; 2) consideration of impacts to cultural resources during the agency's management activities and seeking to avoid or mitigate adverse impacts; 3) protection of cultural resources from looting and vandalism to be accomplished through a mix of informed management, law enforcement efforts, and public education; and 4) the increasing role of consultation with groups, such as Native American tribes, to address how a project or management activity may impact specific archaeological sites and landscapes deemed important to those groups.

The objectives and strategies below outline the Service's attempt to achieve mandated historic preservation responsibilities in a manner consistent with its mission and the refuge's mission.

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

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

ECOSYSTEM MANAGEMENT

Ecosystems are communities of living organisms interacting among themselves and with the physical components of their environment. Ecosystems worldwide are experiencing increasing impacts from human activities, resulting in greater challenges to effective management and conservation. In recent years, conservationists have fostered the idea that resource conservation can best be achieved by taking a holistic approach to management. The ecosystem approach to fish and wildlife conservation means protecting or restoring the function, structure, and species composition of an ecosystem while providing for its sustainable socioeconomic use. It involves recognizing that, in some way, all things within the ecosystem are interconnected. As such, the Service is working with divergent interests on ecosystem-based approaches to conserve the variety of life and its processes in the nation's diverse ecosystems.

The Service's mission is to conserve, protect, and enhance the nation's fish and wildlife and their habitats for the continuing benefit of the American people. Healthy habitats are necessary to sustain fish, wildlife, and plants on lands in the National Wildlife Refuge System. In the past, the administrative boundaries of refuges have often bounded the scope of planning and policy decisions. The Service's objective in ecosystem management is to implement consistent policies and procedures that will embrace the larger "management environment", considering the needs of all resources in decision making. This holistic approach to fish and wildlife conservation enables the Service to more efficiently and effectively maintain healthy ecosystems on a long-term basis and to conserve the nation's rich biological heritage.

In the early 1990s, the Service adopted an ecosystem approach to resource management, identifying 53 separate ecosystems within the United States (USFWS, 1994). Included in this group is the Lower Mississippi River Ecosystem, which encompasses the Hatchie National Wildlife Refuge. The Lower Mississippi River Ecosystem Team, composed of Service personnel and partners with professional expertise in the Lower Mississippi River Valley, focuses on landscape-level problems affecting fish and wildlife resources and provides specific guidance that will best serve trust species and species of concern and reduce impacts associated with forest fragmentation. The ecosystem approach emphasizes conservation and management of discrete land units, watersheds, or ecosystems and requires the identification of ecosystem goals that represent resource priorities. On a more local level, the comprehensive conservation planning team reflects the conservation strategies for national wildlife refuges within the ecosystem and identifies strategies on which to focus management efforts. The Service must work closely and consistently with external partners, public and private, who share responsibility for ecosystem health and biological diversity. This approach enables the Service to fulfill its fish and wildlife trust responsibilities with greater efficiency and effectiveness. (See Chapter I of the Draft Comprehensive Conservation Plan for further discussion of specific ecosystem issues.)

Appendix VII: Public Involvement/Consultation and Coordination

In order to inform and solicit ideas from the public during the planning process, a number of different means were used.

A notice on intent was published in the Federal Register prior to the initiation of the planning process. Local publicity was provided by newspaper interviews and radio interviews early in the planning process and prior to public scoping meetings. Presentations were given at west Tennessee Rotary Clubs, Friends of West Tennessee National Wildlife Refuges meetings, as well as Service Ecoteam meetings and planning workshops.

Prior to the first public scoping meeting, mailings were sent to about 150 persons, media representatives, local officials, and agencies, providing information about 4 upcoming open house/scoping meetings to be held in the west Tennessee area. Flyers were posted in local communities and newspaper articles and radio interviews advertised the upcoming meetings and the comprehensive conservation planning process. A public open house/scoping meeting was held on November 6, 2000, in Brownsville, Tennessee. Attendees were provided an opportunity to learn about the refuge's purpose, mission, and goals, as well as issues and opportunities currently facing refuge management. The planning process was also described and attendees had the chance to provide oral or written comments to be considered in the development of the plan. Attendees at the scoping meeting were provided a signup sheet for a mailing list, a written questionnaire, and opportunities to give public comments and ask questions, both in the scoping meeting and to managers at the open house.

All mailings, presentations, interviews, and meetings provided instructions as to how public input could be provided for the planning process. Throughout the planning process, comments were received by telephone, personal visits, electronic mail, and regular mail.

In addition to public outreach and scoping meetings, a Planning Review Group was developed, consisting of representatives from Ducks Unlimited, local community colleges, TWRA, TNC, Anderson Tully Company, Friends of West Tennessee National Wildlife Refuges, Tennessee State Parks, U.S. Geological Survey, as well as local officials, farmers, and landowners. This group met and was provided an overview of the planning process. The group continued to provide comments during the planning process and provided input on various sections of the plan as it was written.

PUBLIC SCOPING COMMENTS

Specific comments received included:

Address availability and management of cooperative farming lands;

More moist-soil habitat;

More turkey hunting opportunities; more waterfowl opportunities; opening of sanctuary to hunting; non-toxic shot issues; use of all-terrain vehicles; use of deer stands; and more fishing opportunities.

Address beaver flooding, including timber and agricultural losses.

Better refuge information, including refuge fact sheet, display about West Tennessee National Wildlife Refuge Complex, improved brochures, more signs, and quality refuge maps.

Develop a plan to deal with sedimentation; additional watershed protection through land acquisition from willing sellers.

Remove log jams through snagging.