

Wheeler National Wildlife Refuge Complex

Comprehensive Conservation Plan and Environmental Assessment



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

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Submitted by:  **|| S ||**
C. Dwight Cooley, Project Leader
Wheeler NWR Complex


Date: 06/18/2007

Concur:  **|| S ||**
Pete Jerome, Refuge Supervisor
Southeast Region

Date: 7/16/07

Concur:  **|| S ||**
Jon Andrew, Regional Chief
Southeast Region

Date: 7-19-07

Approved by:  **|| S ||**
Sam Hamilton, Regional Director
Southeast Region

Date: 7-20-07

**Comprehensive Conservation Plan
and Final Environmental Assessment**

For

Wheeler National Wildlife Refuge Complex

*Jackson, Lauderdale, Limestone, Madison,
and Morgan Counties, Alabama*

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

The U.S. Fish and Wildlife Service (Service) prepared this Comprehensive Conservation Plan (CCP) and Final Environmental Assessment (EA) to guide the management of Wheeler National Wildlife Refuge (NWR) Complex with refuges located in Jackson, Lauderdale, Limestone, Madison, and Morgan Counties, Alabama. The plan outlines programs and corresponding resource needs for the next 15 years, as mandated by the National Wildlife Refuge System Improvement Act of 1997. Before the Service began planning, it conducted a biological and public use review of the wildlife, habitat, and visitor services management programs at each refuge. Three public scoping meetings were then held to solicit public opinion of the issues the plan should address.

The Service then developed and analyzed four alternatives (A, B, C, and D). **Alternative A** was a proposal to maintain the status quo, which would continue current management practices with limited baseline biological information. No significant changes would be initiated by the Service. All management actions would be directed towards achieving the Complex's primary purposes, including (1) conserving wintering waterfowl habitat; (2) meeting the habitat conservation goals of national and international plans; and (3) and conserving wetlands, all while contributing to other national, regional, and state goals to protect and restore migratory birds, threatened and endangered species, and resident species. Hunting and fishing would continue to be a major focus of the public use program, with no expansion of current opportunities. Current restrictions or prohibitions would remain intact. Environmental education and interpretation, and wildlife observation and photography would remain at present levels.

Alternative B would provide for more public use recreational opportunities, while maintaining current habitat and wildlife management programs. Most habitat management programs would continue. However, habitat improvement projects that would benefit compatible wildlife-dependent public use opportunities would be given a higher priority. At Wheeler NWR, the number of hunting days for small game would be increased within the state hunting season framework and two additional youth fishing rodeos would be held annually. The 2,000-acre area around Garth Slough, presently closed to all public entry from November 15 - January 15, would be evaluated for the possibility of opening select portions of the upland areas to public access. In addition, the hunting of feral hogs would be allowed during both the large game and small game seasons. At Key Cave NWR, feral hogs would be added to the hunting permit and other hunting opportunities would be explored annually.

Increased wildlife observation and photography opportunities would result from the construction of nine new visitor facilities at Wheeler NWR (three photo blinds, three wildlife observation towers, a wildlife viewing platform, a nature trail, and a wildlife drive). Environmental education and interpretation would be expanded by increasing the number of off-refuge programs and by constructing a new environmental education center at Wheeler NWR. New informational brochures would be published for Key Cave, Sauta Cave, and Fern Cave NWRs and visitor access would be improved at Sauta Cave NWR. Personnel priorities would include hiring additional education specialists, wildlife biologists, and at least one additional law enforcement (LE) officer.

Alternative C would maximize wildlife and habitat management while maintaining current public use opportunities. At each NWR, extensive wildlife, plant, and habitat inventories would be initiated. Studies necessary to reduce impacts of contaminants to fish, wildlife, and plants would be initiated and a complex-wide litter control program would be developed. Conservation efforts would increase for threatened and endangered species and nuisance animal species control would be increased.

Any areas within the Complex with pumping and water control capabilities would be managed for moist-soil vegetation, or farmed (with 100 percent of crops left standing) to benefit migratory waterfowl. Cooperative farming would be eliminated and all farming activities would be conducted via contracts or force account (using Complex staff and equipment). Protection of trust resources would be intensified with increased LE activities and a study to analyze the impacts of existing rights-of-way on refuge resources would be initiated. Results would determine if current Complex policy concerning easements should be altered and coordination with local planning departments would be increased. Land acquisition at Fern Cave NWR would remain focused on acquiring land surrounding the fifth cave entrance (Surprise Pit). Land protection within the lower reaches of Piney and Limestone Creeks and lands within the Key Cave high-risk water recharge zone would be explored.

Compatible wildlife-dependent recreation activities would continue as currently scheduled, but only where and when they did not detract from, or conflict with, wildlife management activities and objectives. All Complex lands would be closed at night to the public and select areas of high waterfowl use on Wheeler NWR would be closed from November-March, reducing acreages for public use and eliminating all night bank fishing. Personnel priorities would include employing additional wildlife biologists, biological technicians, maintenance workers, a LE officer, a contamination specialist, and a forester.

The Service selected **Alternative D** as its preferred alternative, which strives for a balanced approach to addressing key issues and refuge mandates, while improving wildlife and habitat management on each refuge. It is designed to optimize habitat management, while providing a balance of appropriate and compatible wildlife-dependent recreational and educational programs for visitors.

Under Alternative D, cooperative farming will continue and areas with water control capabilities will be managed for moist-soil vegetation or will be farmed (with 100 percent of crops left standing) to benefit migratory waterfowl. Nuisance animal species control will be increased and studies necessary to reduce impacts of contaminants to fish, wildlife, and plants will be developed. A complex-wide litter control program will be initiated and conservation efforts increased for threatened and endangered species.

A large majority of Complex lands will be closed at night and select areas of high waterfowl use on Wheeler NWR will be closed from November through March, slightly reducing acreages for public use. However, all six improved boat launching facilities and several other designated night bank fishing areas will remain open at night. A night fishing permit will be required.

Protection of trust resources and visitor safety will be intensified with increased LE activities and a study to analyze the impacts of existing rights-of-way on refuge resources would be initiated. Results will determine if current Complex policy concerning easements should be altered. Coordination with local planning departments will be increased and the priority of land acquisition at Fern Cave NWR will remain focused on acquiring land surrounding the fifth cave entrance (Surprise Pit). Land protection within the lower reaches of Piney and Limestone Creeks and lands within the Key Cave high-risk water recharge zone will be explored.

At Wheeler NWR, the number of hunting days for small game will be increased within the State hunting season framework and an additional youth fishing rodeo will be held annually. Feral hogs will be hunted during both the large game and small game seasons. At Key Cave NWR, the hunting program will be evaluated annually and results will dictate if hunting should be expanded, reduced or remain the same.

Increased wildlife observation and photography opportunities will result from the construction of four new visitor facilities at Wheeler NWR (a photo blind, a wildlife observation tower, a wildlife viewing platform, and a wildlife drive). Environmental education and interpretation will be expanded by increasing the number of off-refuge programs and by constructing an environmental education center at Wheeler. New informational brochures will be published for Key Cave, Sauta Cave, and Fern Cave NWRs and visitor access will be improved at Sauta Cave NWR. Personnel priorities will include employing additional wildlife biologists, biological technicians, maintenance workers, assistant managers, an education coordinator, a law enforcement officer, and a contamination specialist.

SECTION A. COMPREHENSIVE CONSERVATION PLAN

Chapter I. Background

INTRODUCTION

The U.S. Fish and Wildlife Service (Service) developed this Comprehensive Conservation Plan (CCP) to provide a foundation for the management and use of the Wheeler National Wildlife Refuge (NWR) Complex (Wheeler Complex or Complex), with refuges in Jackson, Lauderdale, Limestone, Madison, and Morgan Counties. In addition, the Complex administers five Farm Service Agency (FSA) tracts in conservation easements in Calhoun, Lamar, Limestone, and Marion Counties (Figure 1). This CCP for Wheeler Complex was prepared to guide management actions and direction for the Complex over the next 15 years and will strive to achieve the vision and purpose(s) of each refuge in the Complex.

This CCP was developed in compliance with the National Wildlife Refuge System Improvement Act of 1997 and Part 602 (National Wildlife Refuge System Planning) of the Fish and Wildlife Service Manual. The actions described in this CCP also meet the requirements of the National Environmental Policy Act (NEPA) of 1969. Compliance with NEPA is being achieved through the involvement of the public and the inclusion of a Final Environmental Assessment (EA) in Section B of this document.

The CCP's overriding consideration is to carry out the purpose(s) for which each refuge in the Complex was established. Fish and wildlife conservation will receive first priority in refuge management; wildlife-dependent recreation will be allowed and encouraged as long as it is compatible with, and does not detract from, the mission of the refuges or the purposes for which they were established.

This CCP has been prepared by a planning team comprised of natural resource management professionals, including the Project Leader, Deputy Project Leader, Assistant Refuge Manager, Wildlife Biologist, Supervisory Park Ranger, and Natural Resource Planner from the Wheeler Complex; biologists representing the Alabama Division of Wildlife and Freshwater Fisheries (ADWFF); a recreation specialist from the Tennessee Valley Authority (TVA); and the Chief of Natural Resources from Redstone Arsenal, a military base in which 4,085 acres of Wheeler NWR reside. In addition to the natural resource management professionals listed above, the planning team and Complex staff have incorporated the input and contributions of other agencies, non-governmental organizations, Native American tribes, conservation groups, local citizens, the general public, and other stakeholders. This public involvement and the planning process itself are described and documented in Chapter III, Plan Development.

The CCP represents the Service's preferred alternative and is being put forward after considering three other alternatives, as described in Section B. After reviewing public comments and conservation management needs, the planning team developed these alternatives in an attempt to determine how to best meet the goals and objectives of the Wheeler Complex. The preferred alternative is the Service's recommended course of action for the management of the Complex, and is embodied in this CCP. The Draft CCP and EA was made available to State and Federal government agencies, conservation partners, and the general public for review and comment in April 2007. Comments received through this process were considered in the development of this final document.

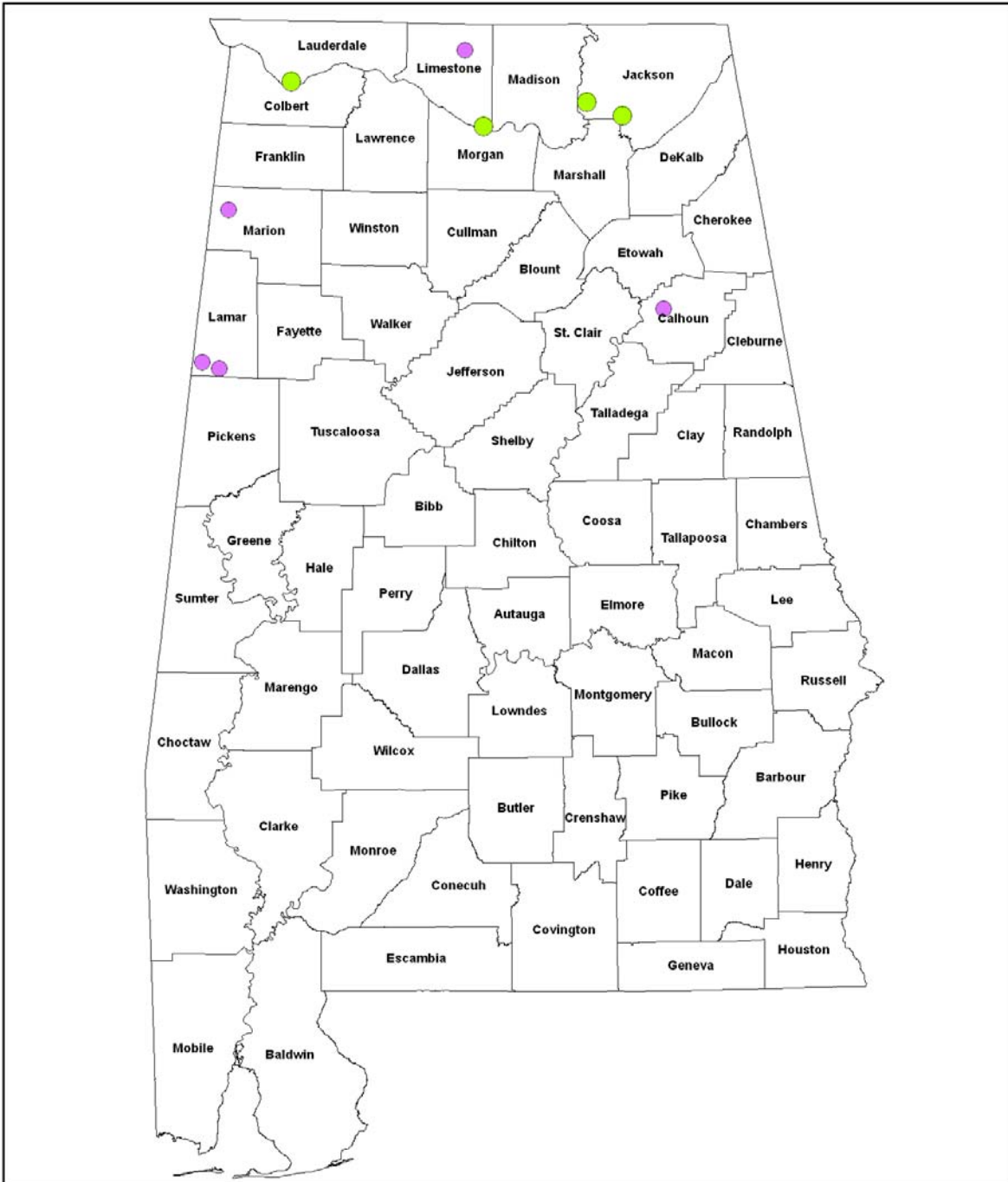
Figure 1. Locations of properties within the Wheeler National Wildlife Refuge Complex



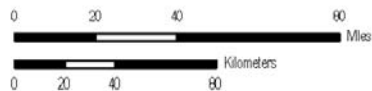
U.S. Fish & Wildlife Service

Wheeler National Wildlife Refuge Complex
 Calhoun, Lamar, Lauderdale, Limestone, Jackson,
 Madison, Marion, and Morgan Counties, Alabama

Locations of Complex Properties



PRODUCED BY WHEELER NWR COMPLEX
 DECATUR, ALABAMA
 MAP DATE: 2/1/06



Legend

- Farm Service Agency Conservation Easements
- National Wildlife Refuges in the Wheeler Complex
- Alabama Counties



PURPOSE AND NEED FOR THE PLAN

The purpose of the CCP is to identify the role the refuge will play in support of the mission of the National Wildlife Refuge System mission and to provide guidance in refuge management and public use activities. The plan describes the Service's management direction (goals, objectives, and strategies) for the next 15 years.

Specifically, the plan is needed to:

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

FISH AND WILDLIFE SERVICE

The Service traces its roots to two historic events. In 1871, the Commission of Fisheries, involved with research and fish culture, was established. The once independent commission was renamed the Bureau of Fisheries and placed in the Department of Commerce and Labor in 1903. In 1886, the Division of Economic Ornithology and Mammalogy in the Department of Agriculture was established. Research on the relationship of birds and animals to agriculture shifted to delineation of the range of plants and animals, so the name was changed to the Bureau of the Biological Survey in 1896.

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

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

As part of its mission, the Service manages more than 545 national wildlife refuges covering over 95 million acres. These areas comprise the National Wildlife Refuge System, the world's largest collection of lands set aside specifically for fish and wildlife. The majority of these lands, 77 million acres, are in Alaska. The remaining acres are spread across the other 49 states and several United States territories. In addition to refuges, the Service manages thousands of small wetlands, 69 national fish hatcheries, and 81 ecological services field stations. The Service enforces federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to State fish and wildlife agencies.

NATIONAL WILDLIFE REFUGE SYSTEM

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

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

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

- Fulfill the mission of the National Wildlife Refuge System;
- Fulfill the individual purpose(s) of each refuge;
- Consider the needs of wildlife first;
- Fulfill requirements of comprehensive conservation plans that are prepared for each unit of the Refuge System;
- Maintain the biological integrity, diversity, and environmental health of the Refuge System; and
- Recognize that compatible 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 wildlife-dependent public uses.

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

Approximately 37 million people visited national wildlife refuges in fiscal year 2004, most to observe wildlife in their natural habitats. As the number of visitors grows, important economic benefits are realized by local communities. In 2001, 82 million people, 16 years and older, fished, hunted, or observed wildlife, generating \$108 billion. In a study completed in 2002, on 15 refuges, visitation had grown 36 percent in seven years. At the same time, the number of jobs generated in surrounding communities grew to 120 per refuge, up from 87 jobs in 1995, pouring more than \$2.2 million into local economies. The 15 refuges in the study were Chincoteague (Virginia); National Elk (Wyoming); Crab Orchard (Illinois); Eufaula (Alabama); Charles M. Russell (Montana); Umatilla (Oregon); Quivira (Kansas); Mattamuskeet (North Carolina); Upper Souris (North Dakota); San Francisco Bay (California); Laguna Atascosa (Texas); Horicon (Wisconsin); Las Vegas (Nevada); Tule Lake

(California); and Tensas River (Louisiana) B the same refuges identified for the 1995 study. Other findings also validate the belief that communities near refuges benefit economically. Expenditures on food, lodging, and transportation grew to \$6.8 million per refuge, up 31 percent from \$5.2 million in 1995. For each federal dollar spent on the Refuge System, surrounding communities benefited with \$4.43 in recreation expenditures and \$1.42 in job-related income (Laughland and Caudill 2003).

Volunteers continue to be a major contributor to the success of the Refuge System. In fiscal year 2005, about 38,000 volunteers contributed nearly 1.5 million hours on refuges nationwide, a service valued at nearly \$26 million.

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

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

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

LEGAL AND POLICY CONTEXT

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

In addition to serving the purposes of each refuge, administration of national wildlife refuges is guided by the mission and goals of the National Wildlife Refuge System, congressional legislation, Presidential executive orders, and international treaties. Policies for management options of refuges are further refined by administrative guidelines established by the Secretary of the Interior and by policy guidelines established by the Director of the Fish and Wildlife Service.

Treaties, laws, administrative guidelines, and policy guidelines assist a refuge manager in making decisions pertaining to soil, water, air, flora, fauna, and other natural resources; historical and cultural resources; research; and recreation on refuge lands, and provide a framework for cooperation between Wheeler Complex and other partners, such as the Alabama Department of Conservation and Natural Resources (ADCNR) and its Division of Wildlife and Freshwater Fisheries (ADWFF), The Nature Conservancy (TNC), Alabama Natural Heritage Program (ANHP), Land Trust of Huntsville and North Alabama, Huntsville Grotto of the National Speleological Society, Ducks Unlimited (DU), Tennessee Valley Authority (TVA), Natural Resources Conservation Service (NRCS), Department of the Army at Redstone Arsenal, Wildlife Habitat Council, Native American tribes and private landowners.

Select legal summaries of treaties and laws relevant to administration of the National Wildlife Refuge System and management of the Wheeler Complex are provided in Appendix C.

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

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

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

Biological Integrity, Diversity, and Environmental Health Policy

The Improvement Act directs the Service to ensure that the “biological integrity, diversity, and environmental health of the Refuge System are maintained for the benefit of present and future generations of Americans.” The policy is an additional directive for refuge managers to follow while achieving refuge purpose(s) and the Refuge System mission. It provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuges and associated ecosystems. When evaluating the appropriate management direction for refuges, refuge managers will use sound professional judgment to determine their refuges’ contribution(s) to biological integrity, diversity, and environmental health at multiple landscape scales. Sound professional judgment incorporates field experience; knowledge of refuge resources and the refuge’s role within an ecosystem; applicable laws; and best available science, including consultation with others both inside and outside the Service (Service Manual 601 FW 3 Biological Integrity, Diversity, and Environmental Health).

NATIONAL AND INTERNATIONAL CONSERVATION PLANS AND INITIATIVES

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

This CCP supports, among others, the North American Bird Conservation Initiative (NABCI), the North American Waterfowl Management Plan (NAWMP), the Partners in Flight Conservation Plan, the U.S. Shorebird Conservation Plan, the Northern American Waterbird Conservation Plan, the Northern Bobwhite Conservation Initiative, the U.S. Woodcock Plan, Fisheries Vision for the Future, and the Partners for Amphibians and Reptile Conservation Plan (PARC).

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

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

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

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

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

Northern Bobwhite Conservation Initiative. This initiative's goal is "to restore northern bobwhite populations range wide to an average density equivalent to that which existed on improvable acres in 1980 [58,857,000]." Habitat management is the primary vehicle for accomplishing this goal with three specific objectives in which the Wheeler Complex considered during the development of this CCP.

U.S. Woodcock Plan. This plan was written by the Service in 1990 to “guide the conservation of woodcock in the United States.” Although no step-down plans have been written, the plan gives general guidance for habitat population management at the national level. Though habitat for woodcock is limited throughout the Wheeler Complex, habitat practices that benefit woodcock were considered during the development of this CCP.

Fisheries Vision for the Future. In 2001, the Service worked with partners to refocus its Fisheries Program and develop a new fisheries vision for the future. Results indicate that the Service will “work with partners to restore and maintain fish and other aquatic resources at self-sustaining levels and to support Federal mitigation programs for the benefit of the American public.” To achieve its vision, the Fisheries Program in conjunction with its partners will strive to:

- Protect the health of aquatic habitats.
- Restore fish and other aquatic resources.
- Provide opportunities to enjoy the benefits of healthy aquatic resources.

Wheeler Complex can contribute to the program’s recreational fishing goal by providing quality opportunities for fishing and other related recreational enjoyment of aquatic resources.

Partners for Amphibians and Reptile Conservation (PARC) Plan. This plan was founded in 1998 to address the need for conservation of herpetofauna – amphibians and reptiles – and their habitats (PARC 2004). Its mission is to conserve amphibians, reptiles, and their habitats as integral parts of the ecosystem and culture through proactive and coordinated public/private partnerships. Although population and habitat data for amphibians and reptiles are limited throughout the Wheeler Complex, habitat practices that benefit amphibians and reptiles were considered during the development of this CCP.

RELATIONSHIP TO STATE WILDLIFE AGENCY

A provision of the National Wildlife Refuge System Improvement Act of 1997, and subsequent agency policy, is that the Service shall ensure timely and effective cooperation and collaboration with State fish and game agencies and Tribal governments during the course of acquiring and managing refuges. State wildlife management areas and national wildlife refuges provide the foundation for the protection of species, contributing to the overall health and sustainment of fish and wildlife species in the State of Alabama.

The Alabama Department of Conservation and Natural Resources (ADCNR) provides protection and management for the State's fish and wildlife resources through conservation enforcement officers in each county statewide and through fisheries and wildlife biologists. The Department’s major goal is to promote stewardship and enjoyment of Alabama’s natural resources, both for present and future generations. It is responsible for freshwater fish, wildlife, marine resources, waterway safety, state lands, state parks, and other natural resources. The Department manages 24 State parks, 23 fishing lakes, three fish hatcheries, two waterfowl refuges, two wildlife sanctuaries, 34 wildlife management areas, and a mariculture center. It has responsibility for more than 645,000 acres of trust lands set aside for wildlife purposes. Other departmental functions include maintenance of a State Land Resource Information Center and administration of the Forever Wild land acquisition program.

The State’s participation and contribution throughout this planning process provided an opportunity for developing an open dialogue to help improve the ecological sustainment of fish and wildlife in the State of Alabama. An essential part of comprehensive conservation planning is integrating common mission objectives where appropriate.

Chapter II. Refuge Overview

INTRODUCTION

The Wheeler National Wildlife Refuge (NWR) Complex is currently comprised of seven refuges spread across 12,500 square miles of northern Alabama. In addition, the Wheeler Complex administers five Farm Service Agency (FSA) conservation easement tracts. This CCP covers four of the seven refuges: Wheeler (1938), Key Cave (1997), Sauta Cave (1978) (formerly known as Blowing Wind Cave), and Fern Cave (1981). The other three refuges, Cahaba River (2002), Mountain Longleaf (2003), and Watercress Darter (1980), will be addressed at a later date in a separate CCP. For the purpose of this document, the term Wheeler Complex will refer only to Wheeler (37,200 acres), Key Cave (1,060 acres), Sauta Cave (264 acres), and Fern Cave (199 acres) NWRs; plus the five FSA conservation easements (Coley Tract - 161 acres, Pepper Tract - 49 acres, Rollins Tract - 20 acres, Speed Tract #1 - 83 acres, and Speed Tract #2 - 63.43 acres). All together, properties in the Wheeler Complex total approximately 38,900 acres (Figure 2).

The headquarters for the Wheeler Complex is located at Wheeler NWR in Decatur, Alabama. The Complex currently has a staff of 15 full-time employees and one term employee. One of the full-time positions is jointly funded by the Divisions of Refuges and Ecological Services. In 2006, more than 50 volunteers donated over 5,000 hours to the Wheeler Complex. The Complex headquarters has an administrative office, maintenance facilities, a large Visitor Center, and a Waterfowl Observation Building. Public use is heavy and an estimated 650,000 people visit the Complex each year. The address for the Wheeler Complex is 2700 Refuge Headquarters Road, Decatur, Alabama 35603. The telephone number for the headquarters administrative office is (256) 353-7243 and for the Visitor Center (256) 350-6639. The headquarters administrative office is open Monday through Friday from 7:00 a.m. until 3:30 p.m. The Visitor Center and Waterfowl Observation Building are open from 9:00 a.m. until 4:00 p.m. Tuesday through Saturday (March through September), and seven days each week (October through February) from 9:00 a.m. to 5:00 p.m.

REFUGE HISTORY AND PURPOSE

Although Wheeler Complex has an overriding focus of providing important habitat and protection for migratory birds, with an emphasis on waterfowl, each refuge within the Complex has a unique purpose and establishing legislation or authority (Table 1). This planning document identifies specific goals, objectives, and overall strategies that are intended to support the purposes for each individual refuge. Management activities for Wheeler, Key Cave, Sauta Cave, and Fern Cave NWRs have been combined due to their close proximity to each other, the similarity of issues and habitats, and shared personnel in order to manage the Wheeler Complex as a single unit within the Lower Tennessee-Cumberland Ecosystem (LTCE).

WHEELER NWR

Located among the cities of Athens, Decatur, and Huntsville, Wheeler NWR was established in 1938, by Executive Order 7926, as a refuge and breeding ground for migratory birds and other wildlife. Additional purposes were added later under the authorities of the Migratory Bird Conservation Act of 1929 and the Refuge Recreation Act of 1962. This 37,000-acre refuge is overlaid on the middle third of the Tennessee Valley Authority's (TVA) Wheeler Reservoir with property located in Limestone, Madison, and Morgan counties (Figure 3). Lands were acquired in 1934 and 1935 by TVA to serve as a buffer strip for the Reservoir, which was impounded a year later in 1936.

Figure 2. Land status map for the Wheeler National Wildlife Refuge Complex

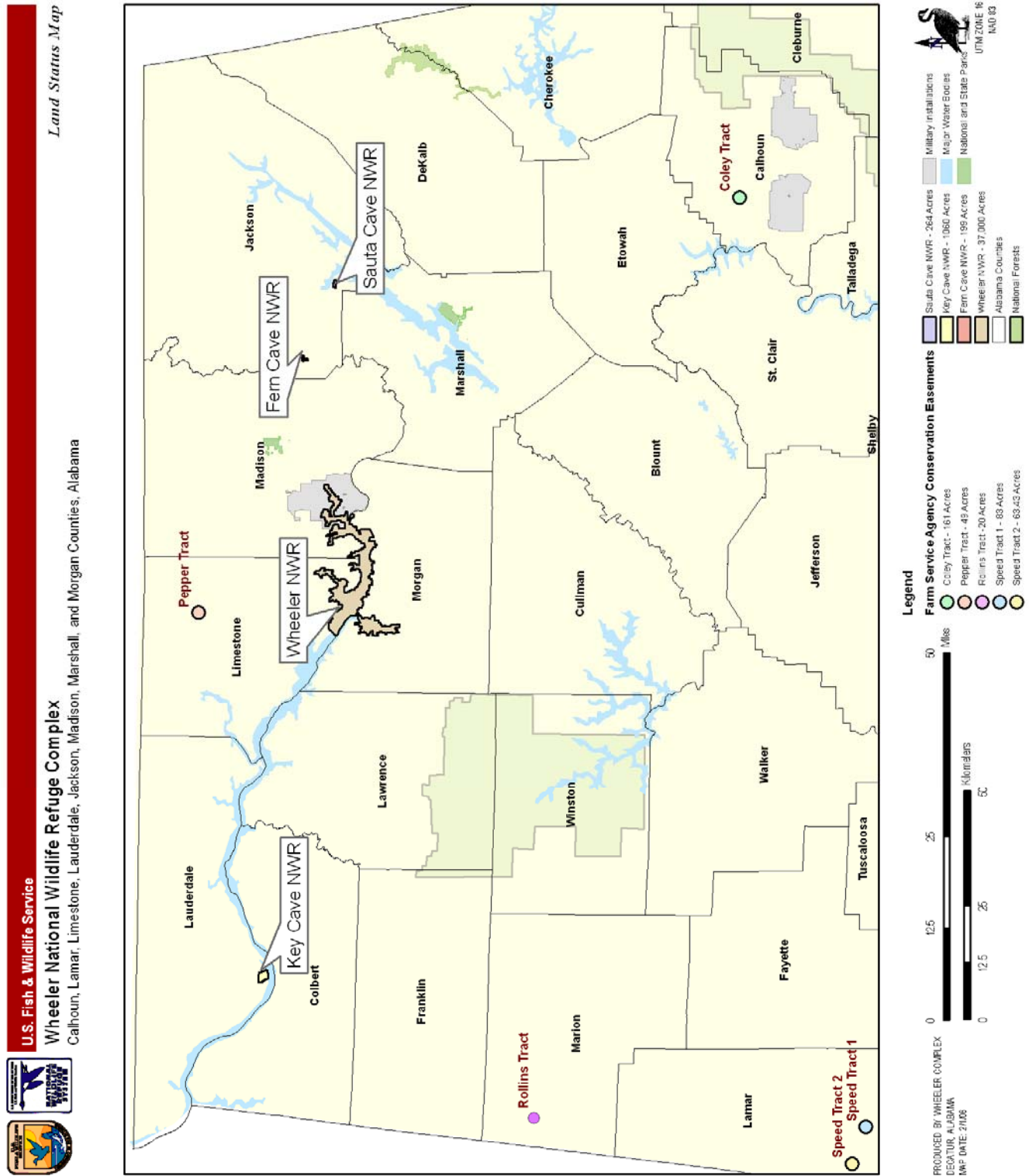


Table 1. Establishment date, establishment authority or legislation, and purpose(s) for each refuge in the Wheeler Complex

| Refuge | Year Established | Establishing Authority or Establishing Legislation | Refuge Purpose(s) |
|------------|------------------|--|---|
| Wheeler | 1938 | Executive Order 7926 (July 7, 1938) | <p>“...as a refuge and breeding ground for migratory birds and other wildlife...”</p> <p>“...for use as an inviolate sanctuary, or for any other management purposes, for migratory birds...”^a</p> <p>“...suitable for (1) incidental fish and wildlife-oriented recreation development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species...”^b</p> |
| Sauta Cave | 1978 | Endangered Species Act (1973) | “...to conserve (A) fish or wildlife which are listed as endangered species or threatened species...” |
| Fern Cave | 1981 | Endangered Species Act (1973) | “...to conserve (A) fish or wildlife which are listed as endangered species or threatened species...” |
| Key Cave | 1997 | <p>National Wildlife Refuge Administration Act (1966)</p> <p>Fish and Wildlife Act (1956)</p> <p>Endangered Species Act (1973)</p> | <p>“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...”</p> <p>“... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ...”</p> <p>“...to conserve (A) fish or wildlife which are listed as endangered species or threatened species...”</p> |

^a Additional purpose(s) identified under the Migratory Bird Conservation Act of 1929

^b Additional purpose(s) identified under the Refuge Recreation Act of 1962

Considered the eastern most national wildlife refuge in the Mississippi Flyway, Wheeler NWR provides winter habitat for the State's largest duck population and formerly supported the southernmost and Alabama's only major concentration of wintering Canada geese. In recent years, the number of Canada geese from the Southern James Bay Population, wintering on the refuge, has declined due to a number of reasons. Snow geese are now the most prominent component of the winter goose population.

Refuge habitats consist of bottomland hardwoods, mixed hardwoods, pine uplands, moist soil units, and agricultural fields that support interesting flora, a bird list of 295 species, and a wide variety of mammals, reptiles, amphibians, and fishes.

KEY CAVE NWR

Key Cave NWR was established in 1997 under the authority of the Fish and Wildlife Act of 1956, the Endangered Species Act of 1973, and the National Wildlife Refuge Administration Act of 1966, to ensure that the biological integrity of Key Cave, Collier Cave, Collier Bone Cave, and their common aquifer remains intact (Figure 4). Key Cave is the only known location for the federally endangered Alabama cavefish (*Speoplatyrhinus poulsoni*) and lies on the northern shore of Pickwick Lake in a limestone karst area that contains numerous sinkholes and several underground cave systems. The area's sinkholes are an integral component of groundwater recharge to the caves.

Prior to 1992, the Monsanto Company owned a large 1,060-acre tract of land just north of Key Cave and about five miles southwest of Florence, Lauderdale County, Alabama, in the high-hazard risk area of the Key Cave aquifer. In 1992, the company sold this tract to The Conservation Fund, which held the land until the Service acquired the land five years later to establish Key Cave NWR.

In addition to the Alabama cavefish, Key Cave also serves as a priority one maternity cave for the federally endangered gray bat (*Myotis grisescens*), as well as habitat for two species of blind crayfish (*Procambarus pecki*) and (*Cambarus jonesi*). Collier Cave, located approximately 1.5 miles upstream from Key Cave, and Collier Bone Cave are also considered potential habitat for these cave species. Cave entrances are located on TVA lands on the northern shore of Pickwick Lake. Furthermore, the refuge provides habitat for a variety of migratory and resident wildlife species. Several priority bird species commonly occurring on the refuge include: dickcissel, grasshopper sparrow, field sparrow, northern bobwhite, northern harrier, and short-eared owl.

SAUTA CAVE NWR

Sauta Cave NWR, known as Blowing Wind Cave NWR until 1999, lies just above the Sauty Creek embayment of TVA's Guntersville Reservoir, seven miles west of Scottsboro, Jackson County, Alabama (Figure 5). The refuge established in 1978, under the authority of the Endangered Species Act of 1973 to provide protection for the federally endangered gray and Indiana (*Myotis sodalis*) bats and their crucial habitat consisting of 264 acres of hardwood forest. The cave provides a summer roosting site for about 300,000 - 400,000 gray bats and a winter hibernaculum for both bats.

Besides the endangered bats, many other species occur in the cave, including the Tennessee cave salamander (*Gyrinophilus palleucus*) and the cave salamander (*Eurycea lucifuga*). Additionally a relatively large (>250 individuals) population of Price's potato-bean (*Apios priceana*), a federally threatened plant species, is found on the refuge. The cave has upper and lower gated entrances and 14,628 feet of mapped passage. Formations in the lower cave have been described as spectacular and petroglyphs have been found on the cave ceilings. In the past, the cave was used as a saltpeter mine during the Civil War, a nightclub during the 1920s, and a fallout shelter during the 1960s.

Figure 3. Wheeler National Wildlife Refuge

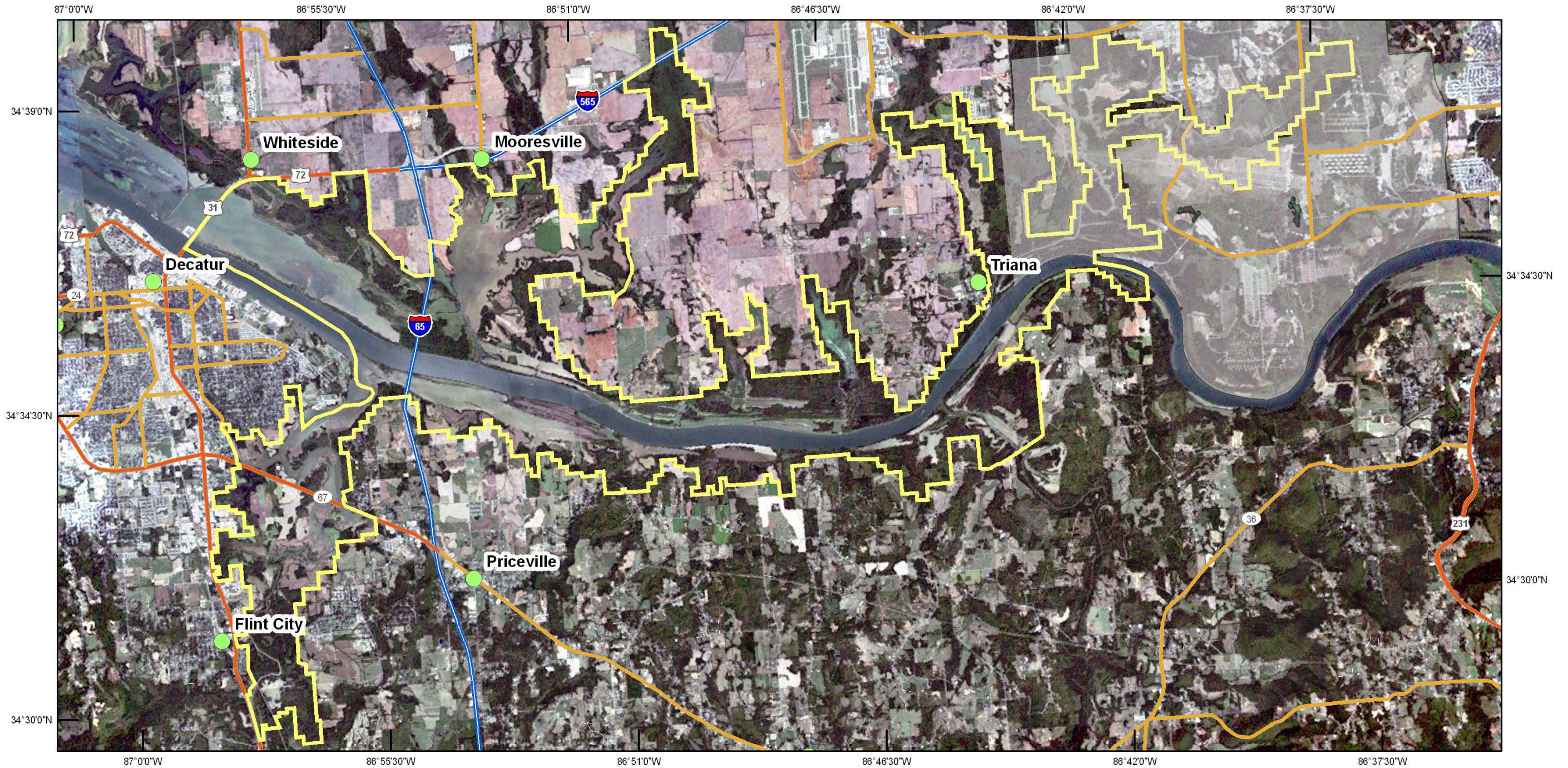


U.S. Fish & Wildlife Service

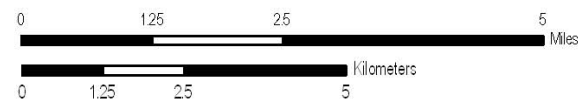
Wheeler National Wildlife Refuge

Limestone, Madison, and Morgan Counties, Alabama

Management Boundary for Wheeler NWR



PRODUCED BY WHEELER NWR COMPLEX
 DECATUR, ALABAMA
 MAP DATE: 2/1/06
 BASEMAP: 1 METER BW AERIAL PHOTO WITH
 30 METER LANDSAT TM IMAGE
 BASEMAP (Date): MARCH 2005



Legend

- Local Cities
- Wheeler NWR Management Boundary
- Redstone Arsenal Military Installation



Figure 4. Key Cave National Wildlife Refuge

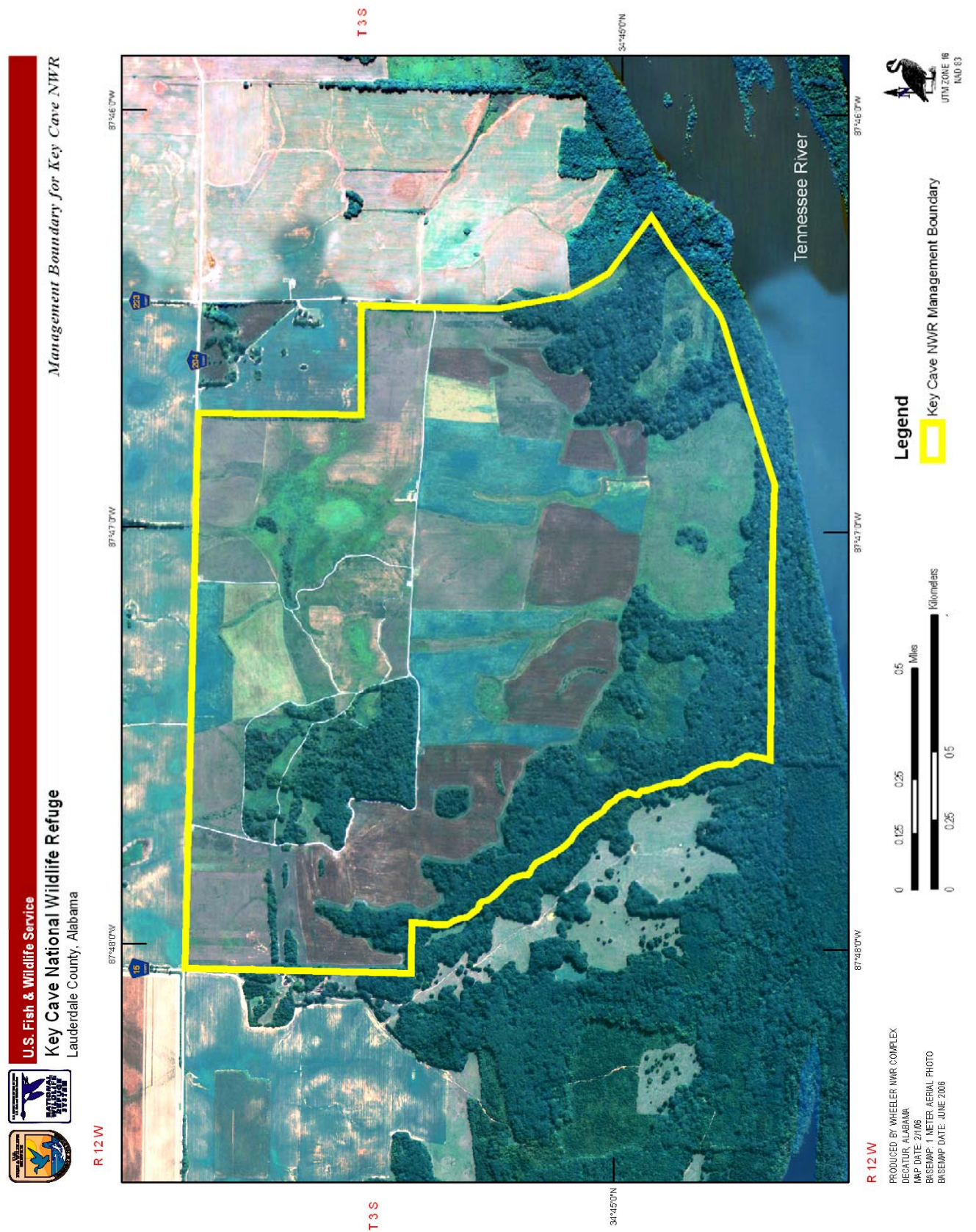


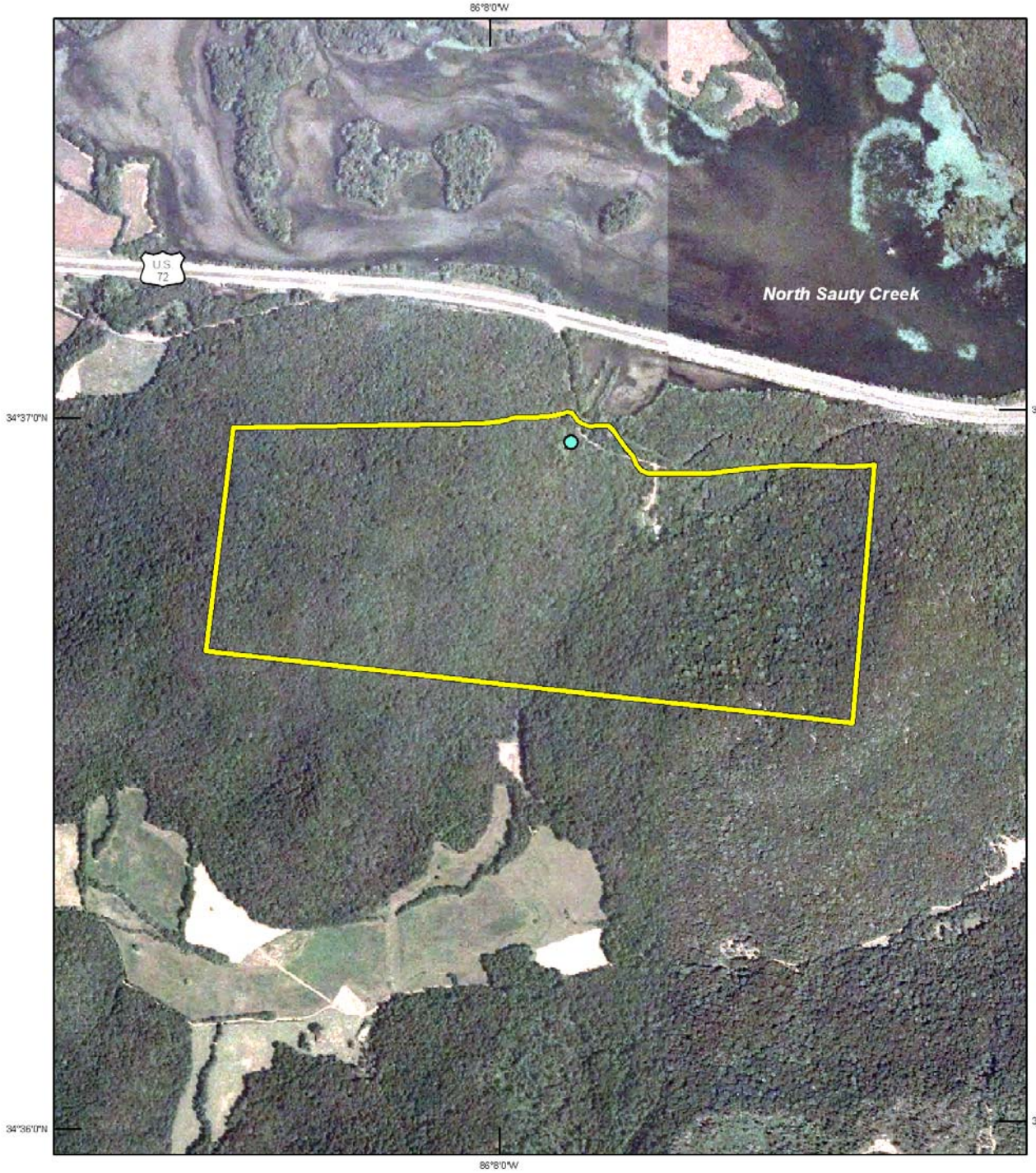
Figure 5. Sauta Cave National Wildlife Refuge



U.S. Fish & Wildlife Service

Sauta Cave National Wildlife Refuge
Jackson County, Alabama



Management Boundary for Sauta Cave NWR



PRODUCED BY WHEELER NWR COMPLEX
DECATUR, ALABAMA
MAP DATE: 2/1/06
BASEMAP: 2 METER AERIAL PHOTO
BASEMAP DATE: JUNE 2005



Legend

-  Sauta Cave Lower Entrance
-  Sauta Cave NWR Management Boundary



UTM ZONE 16
NAD 83

FERN CAVE NWR

Fern Cave NWR was established in 1981, under the authority of the Endangered Species Act of 1973, to provide protection for the endangered gray and Indiana bats. The refuge is located 20 miles west of Scottsboro and two miles northeast of Paint Rock in Jackson County, Alabama, and consists of 199 acres of forested hillside underlain by a massive cave with many stalactite and stalagmite-filled rooms. An additional 483 acres of land are included in the approved acquisition boundary of the refuge (Figure 6).

The cave itself has five hidden entrances, with four of these currently occurring on the refuge. The fifth entrance (Surprise Pit) is located within the approved acquisition boundary for the refuge. Recent estimates indicate that one million gray bats hibernate in the cave, making it the largest wintering colony of gray bats in the United States. In the past, the threatened American Hart's-tongue fern (*Phyllitis scolopendrum* var. *americana*) has been found on Fern Cave NWR. Two decades ago, 20 individual plants were documented on the refuge; however, the most recent survey was not able to find the American Hart's-tongue fern. The plant may still be present in the form of spores in the soil and may produce plants in future years.

SPECIAL DESIGNATIONS

In 1941, for reasons of national security, about 4,085 acres of Wheeler NWR were included inside the boundary of Redstone Arsenal, a U.S. Army military installation. Currently, about 1,500 acres of the original 4,085 acres are partially administered by the Marshall Space Flight Center, National Aeronautics and Space Administration (NASA). Generally, the Complex does not actively manage the refuge lands within the Arsenal's boundary. For example, hunting and fishing programs in those areas are administered by law enforcement personnel stationed at Redstone Arsenal.

Additionally, a 30-acre tupelo gum swamp, located on the north side of the Tennessee River along Beaverdam Creek on Wheeler NWR, was officially designated as a National Natural Landmark in 1974. This habitat is unique because this tupelo gum swamp occurs in the Interior Low Plateau physiographic region, rather than its usual occurrence in the Gulf Coastal Plain region.

ECOSYSTEM CONTEXT

Conservation of the Service's trust resources (i.e., endangered species, migratory birds, interjurisdictional fisheries, and marine mammals) will require the long-term maintenance of healthy ecosystems. An ecosystem approach will require a holistic view of resource conservation, recognizing that all things are connected. To be effective, an ecosystem approach will not only mean protecting or restoring the function, structure, and species composition of an ecosystem, but also factoring in the impacts of and providing for sustainable socioeconomic activity (USFWS 1995).

Refuges in the Wheeler Complex are located within a physiographic region known as the Lower Tennessee-Cumberland Ecosystem (LTCE) (Figure 7). The LTCE is composed of two large watersheds, the lower half of the Tennessee River and the entire drainage of the Cumberland River. The lower Tennessee River encompasses that portion of the river valley located in northern Alabama, middle Tennessee, and west Tennessee. It is within the Tennessee River Valley of northern Alabama that the refuges within the Wheeler Complex are located.

Figure 6. Fern Cave National Wildlife Refuge

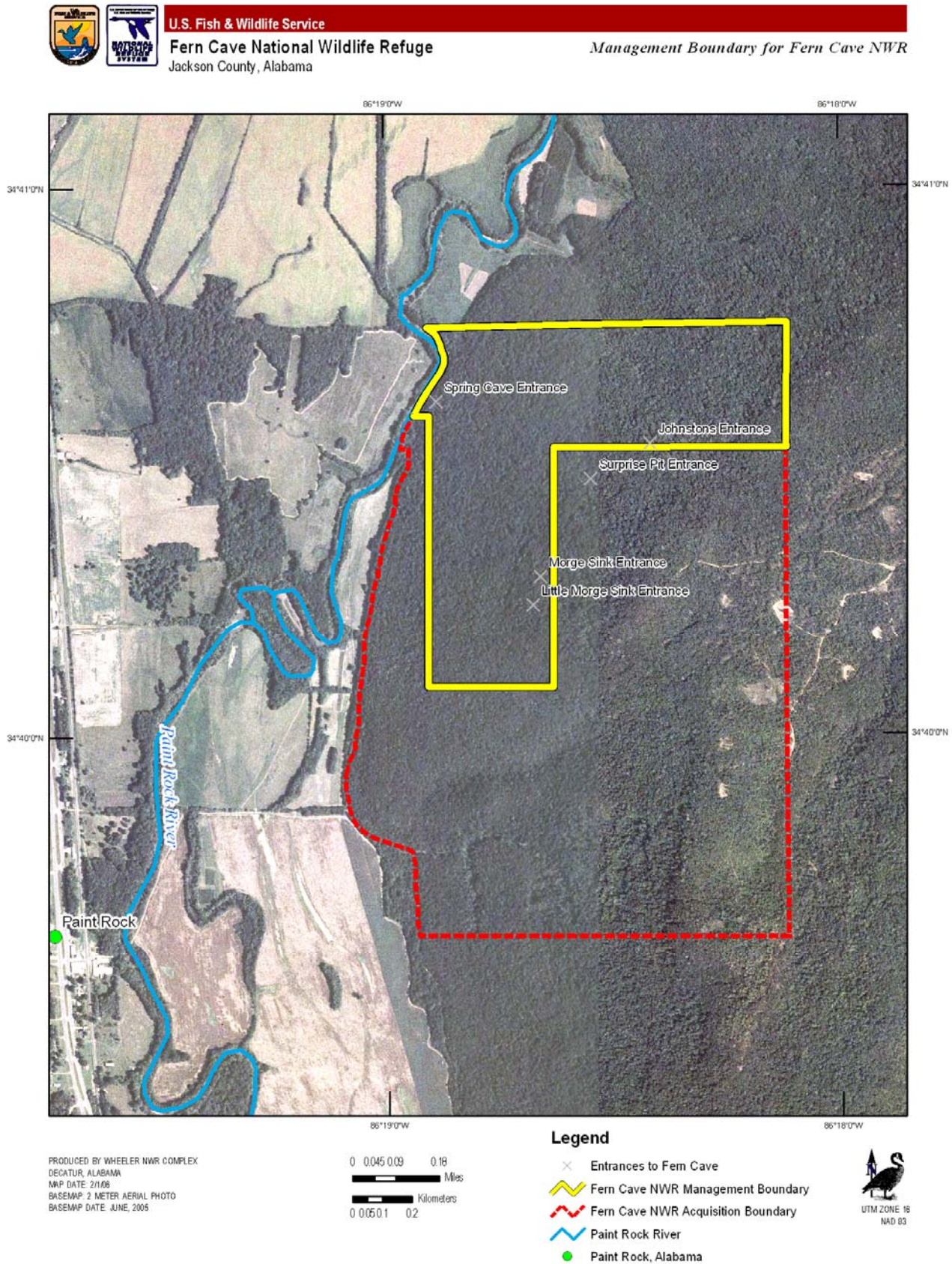
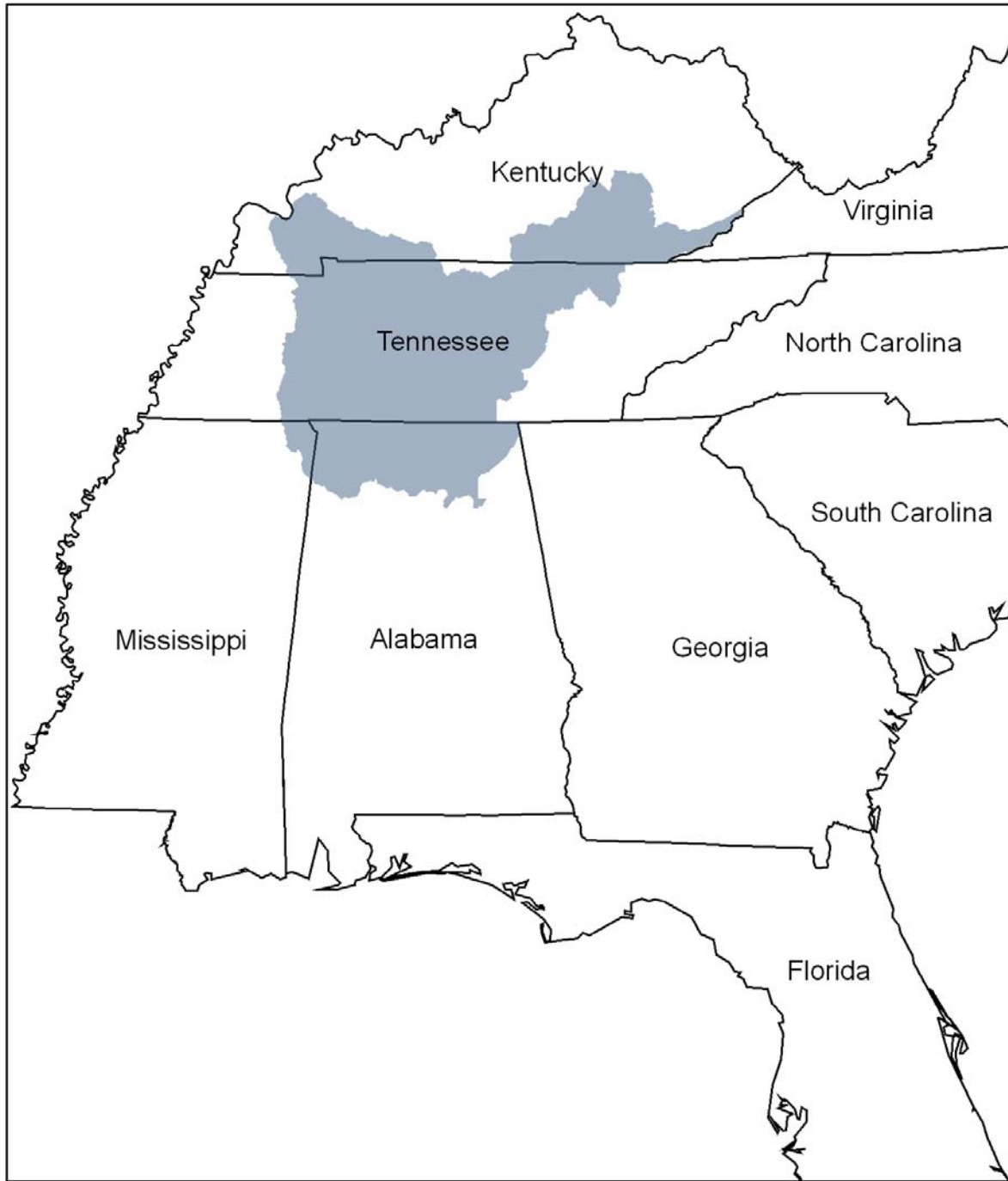


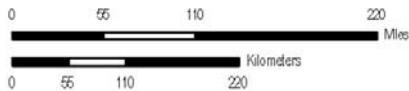
Figure 7. Lower Tennessee-Cumberland Ecosystem



Boundary Extent for the LTCE



PRODUCED BY WHEELER NWR COMPLEX
DECATUR, AL
MAP DATE: 2/1/06



Legend
Lower Tennessee-Cumberland Ecoregion
State Boundaries



REGIONAL CONSERVATION PLANS AND INITIATIVES

Several regional conservation plans and initiatives relate to Wheeler Complex, including the Central Hardwoods Joint Venture Concept Plan (CHJVCP), the Lower Tennessee - Cumberland Ecosystem Strategic Plan, and the Alabama Comprehensive Wildlife Conservation Strategy (CWCS).

CENTRAL HARDWOODS JOINT VENTURE CONCEPT PLAN (2003)

The Central Hardwoods is one of 67 bird conservation regions (BCRs) across North America identified by the four major bird initiatives and their conservation partners under the auspices of the North American Bird Conservation Initiative (NABCI). The boundary for the Central Hardwoods Bird Conservation Regions (CHBCR) overlaps nine states (i.e., Missouri, Arkansas, Oklahoma, Alabama, Tennessee, Kentucky, Illinois, Indiana, and Ohio); Regions 2, 3, and 4 of the Fish and Wildlife Service; Regions 8 and 9 of the USDA Forest Service; and two other formally recognized Joint Ventures, the Upper Mississippi/Great Lakes Joint Venture (UM/GLJV) and the Lower Mississippi Valley Joint Venture (LMVJV).

Representatives of each overlapping Federal and State land-managing agency, Joint Venture, and other conservation organizations attended a scoping meeting in Memphis, Tennessee, in May 2000, to determine the level of interest in and support for a conservation partnership for the Central Hardwoods BCR. The group endorsed the development of a Joint Venture partnership throughout the CHBCR. This partnership was established to embrace the primary goal of the NABCI Initiative "to deliver the full spectrum of bird conservation through regionally based, biologically driven, landscape oriented partnerships" (NABCI 2003).

In addition, the Joint Venture seeks to base conservation delivery upon sound science and the principles of adaptive management, and to target conservation actions toward landscapes with the greatest ecological and socioeconomic potential to support viable populations of priority birds in four general habitat types: grasslands; grass-shrublands; forest-woodlands; and wetlands. This partnership also seeks to strengthen the biological foundation upon which planning and evaluation are based and to initiate projects and fund-raising for habitat and other work that will further the conservation objectives of the various bird initiatives encompassed by NABCI.

The CHBCR boundary straddles the Mississippi River between Illinois and Missouri; the region to the west is also known as the Ozarks or Interior Highlands, and the region to the east, the Interior Low Plateaus. It lies within a transition zone between what were historically tallgrass prairie, oak savanna, and woodlands to its north and west; pine forests and woodlands to the south; and oak and mixed mesophytic forests to the east.

According to the CHJVCP the greatest future threat to existing bird habitat in the CHBCR is likely to be the continuing expansion of urban sprawl into rural areas. Of the 318 counties associated with the CHBCR, only 25 counties experienced a loss in population between 1990 and 2000 (U.S. Census Bureau 2000). The counties in the CHBCR with population increases greater than 25 percent were adjacent to urban areas (Fitzgerald et al., 2003).

Priority species and their conservation needs for the CHBCR have been identified by Partners in Flight (Rich et al., 2005); the United States Shorebird Conservation Plan (Brown et al., 2001); the North American Waterbird Conservation Plan (Kushlan et al., 2002); the 2004 North American Waterfowl Management Plan Strengthening the Biological Foundations (NAWMP 2004), and the Northern Bobwhite Conservation Initiative (Dimmick et al., 2002). A list of priority species and their general habitat affiliations for the Central Hardwoods BCR are presented in Appendix L.

LOWER TENNESSEE – CUMBERLAND ECOSYSTEM STRATEGIC PLAN (1995)

The LTCE Team developed a strategic plan in 1995 for the conservation of the Tennessee River and Cumberland River watersheds' natural animal and plant diversity through perpetuation of a dynamic, healthy ecosystem. The purpose of this ecosystem management plan is to outline goals, objectives, and strategies to protect and restore Service trust resources and ecological integrity within the LTCE. This plan recognizes that ecosystem function, natural community structure, and species composition are integral to the conservation of the Service's trust resources. It also recognizes that the Service is just one of many partners, all of whom share responsibility for ecosystem health. These partners include Federal, State, and local agencies; communities; organizations; and corporate and private landowners.

The LTCE strategic plan identified four goals which this CCP considered during the planning process to ensure the Complex continues its overall contribution to Alabama wildlife conservation and habitat integrity.

Goals:

- Protect, restore, and enhance habitats and essential processes necessary to maintain healthy biological diversity;
- Promote and support compatible and sustainable uses of the resource found within the LTCE;
- Increase public knowledge and support for ecosystem resources and their management; and
- Increase coordination and cooperation among organizations to enhance effective and efficient management of natural resources.

In addition to the strategic plan, the Migratory Bird Committee of the LCTE team developed a Bird Conservation Plan (BCP) that covers many of the migratory bird groups. Categories include waterfowl, forest-dependent migratory birds, grassland birds, and shorebirds. Specific objectives or strategies related to Wheeler Complex are listed below:

- Provide adequate foraging habitat for 8.2 million duck-use-days and 2.8 million goose-use-days in the three Alabama counties that include Wheeler NWR (i.e., Limestone, Madison, and Morgan Counties).
- Establish and secure a 20,000-acre block of forested wetland within the Tennessee River floodplains with its core around the refuge. Priority species include the wood thrush, cerulean warbler, prothonotary warbler, and Swainson's warbler.
- As a strategy to establish and/or maintain at least 55 areas of sustainable source populations of mature hardwood forest birds, a management and monitoring plan needs to be developed for areas such as Wheeler NWR. Each of the 55 areas is defined as "... a block of approximately 7,500 to 10,000 acres that is at least 70 to 80 percent forested (preferably 85-95 percent forested), within which a core of about 3,000 acres of mature hardwood forest is managed for cerulean warblers.
- Establish a minimum of two "flagship" sites where joint management strategies and modeling exercises will be developed for shorebirds. One possible site is Swan Creek Wildlife Management Area/Wheeler NWR.

The BCP also includes objectives and strategies that generally may apply to Wheeler NWR. Examples include those listed below:

- Along with partners, provide nesting and brooding habitat for cavity nesting ducks with wood ducks being a priority.

-
- Inventory waterfowl populations at least monthly from October through March.
 - Manage forested habitats on Service lands using sound silvicultural practices to improve vertical structure and habitat diversity across all forest strata.
 - Develop key educational messages about shorebirds that can be used to reach target audiences.

ALABAMA COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY (2005)

The Alabama Department of Conservation and Natural Resources (ADCNR) Division of Wildlife and Freshwater Fisheries (ADWFF) Comprehensive Wildlife Conservation Strategy (CWCS) was completed in 2005. The purpose of this document is to provide direction for and coordination of wildlife conservation efforts in Alabama for the next decade. The overall goal is to identify and conserve those species in greatest need for conservation action, while also addressing the full array of wildlife and habitats.

This publication identifies those wildlife species of greatest conservation need and actions needed to conserve Alabama's wildlife and their key habitats. Information relative to these species and those habitats found on Refuge System lands will be evaluated for opportunities to foster conservation efforts.

Upon review of the Alabama CWCS, the Service has identified four objectives that this CCP considered during the planning process to ensure that the Complex continues its contribution and support for Alabama wildlife conservation and habitat integrity. These four objectives are listed below:

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

Overarching statewide conservation actions were also developed, as many actions recurred for many species and habitats, and in existing conservation plans. Alabama's conservation actions therefore addressed needs at several levels and multiple scales (ADWFF 2005). Please see Appendix M for a comparison of Statewide Conservation Actions in relation to each of the proposed alternatives for the Wheeler Complex CCP. Differences are noted in a comprehensive table as either supporting or not supporting statewide actions.

ECOLOGICAL THREATS AND PROBLEMS

The Wheeler Complex faces a variety of ecological threats and problems. The most important of these threats and problems are habitat loss and fragmentation, the proliferation of invasive species (plant and animal), and the degradation of aquatic ecosystems.

HABITAT LOSS AND FRAGMENTATION

One of the primary threats to the Wheeler Complex is the historic and ongoing loss and degradation of wildlife habitat, largely due to development pressures related to Alabama's increasing human population. Alabama has a population in excess of 4.4 million, a 10 percent increase from 1990 to 2000 (U.S. Census Bureau 2000). The U.S. Census Bureau estimates that by the year 2025 Alabamians will number 5.22 million, a 17 percent increase from 2000 (Campbell 1997). To make matters worse, the Huntsville/Madison/Decatur area, which surrounds Wheeler NWR, is one of the fastest growing areas in the State with a combined population in excess of 250,000 (U.S. Census Bureau 2000).

Land clearing for agriculture, flood control projects, transportation corridors, and rights-of-way, and more recently for residential development has had a tremendous effect on the biological diversity, biological integrity, and environmental health of the LTCE. Large tracts of bottomland hardwood forests have been reduced to forest fragments ranging from very small tracts of just a few acres in size with limited functional value to a few large areas of more than 10,000 acres that have maintained many of the original functions and values of bottomland hardwood forest.

Bottomland hardwoods and associated wetlands support substantial wintering populations of waterfowl species. They are also a high-priority nesting habitat for other migratory birds. Currently, more than 70 species of breeding migratory songbirds are found in the area. Some of these species, including Swainson's warbler, prothonotary warbler, wood thrush, and cerulean warbler, have declined and need large forested blocks to recover, survive, and thrive.

PROLIFERATION OF INVASIVE SPECIES (PLANTS AND ANIMALS)

Each year in the United States, invasive species cause billions of dollars in damage. Estimated damage and control cost of invasive species in the United States alone amount to more than \$138 billion annually (Pimentel et al., 2005). In addition to these costs, economic losses can occur due to loss from recreational and tourism revenues (Simberloff 2001). Wheeler Complex has several documented invasive pest plant and animal species. These species impact the Complex's ability to carry out desired management objectives.

Alligatorweed (*Alternanthera philoxeroides*), Eurasian watermilfoil (*Myriophyllum spicatum*), and American lotus (*Nelumbo luteas*) are major invasive aquatic species. These species threaten natural aquatic vegetation that is important to wetland systems and choke open waterways to a degree that often prevents recreational use. Chinese privet (*Ligustrum sinense*), kudzu (*Pueraria montana*), Bermuda grass (*Cynodon dactylon*), and Johnson grass (*Sorghum halepense*), and to a lesser extent wisteria (*Wisteria venusta*) and ornamental bamboo (*Bambusa multiplex*), are terrestrial invasive plant species of concern throughout the Complex. Currently, the Complex implements control measures when budgets and work force allows.

Invasive and nuisance animal species, such as feral hogs (*Sus scrofa*) and beavers (*Castor canadensis*) destroy habitat. Beavers kill and damage stands of trees when dam and lodge construction holds water in areas longer than normal that results in prolonged flooding. These events cause massive die-offs of large tracts of mature bottomland hardwoods, which take decades to recover. In addition, flooding events can back water up and flood adjacent landowners' properties.

Feral hogs compete with native wildlife for food and they prey on small vertebrates and invertebrates. They destroy habitat at a rapid pace by rooting, which kills wetland vegetation and damages refuge roads and dikes. These actions then provide favorable conditions for the spread of invasive plants.

Another invasive species, the Zebra mussel, has been documented in the Tennessee River; however it is not understood why this species has not expanded into large colonies. The absence of current management problems does not mean future problems will not occur. Control will require efforts of essentially all Federal, State, and local partners, including adjacent landowners.

DEGRADATION OF AQUATIC ECOSYSTEMS

The Tennessee River Valley is comprised of several aquatic ecosystems that have been greatly deteriorated by human activities. Impacts to aquatic species and their habitat include: impoundment of free flowing streams and rivers; habitat degradation from erosion and sedimentation; misuse of fertilizers, pesticides and herbicides; toxic chemical discharges from both point and non-point sources; and competition from exotic and/or invasive aquatic species. All of these events have led to degradation of aquatic ecosystems within the Tennessee River Valley and each refuge within the Wheeler Complex.

One of the most damaging events to aquatic ecosystems in the Tennessee River Valley has been the historical use of organochlorine pesticides (e.g., DDT, PCB's, toxaphene, dieldrine, and lindane), which contain heavy metals, such as mercury. These chemicals were commonly used in farming operations (especially cotton) prior to being banned in the 1970s. These persistent chemicals were used throughout northern Alabama and can remain in the soil substrate for long periods of time. These chemicals have been linked to an assortment of contamination issues and continue to detrimentally impact fish and other aquatic-dependent resources, such as fish-eating birds, wood ducks, and raccoons.

PHYSICAL RESOURCES

CLIMATE

The climate of the Tennessee River Valley in northern Alabama is humid and temperate, with temperatures ranging from -5 degrees to 110 degrees Fahrenheit (F). Summers are long and hot, and generally the winters are mild and pleasant. The average summer temperature is 79 degrees F, with an average maximum temperature of 89 degrees F. In winter, the average temperature is 42 degrees F and the average daily minimum temperature is 32 degrees F. Temperatures at higher elevations are generally 5 to 6 degrees lower. Occasionally, temperatures in the winter will drop below freezing and will sometimes remain below freezing for one to four days.

Frost can be expected from the middle of October until the latter part of March. Prevailing winds are normally from the northwest; however during the fall and winter months winds from the west and northeast are common. The average wind velocity is highest during the winter and lowest during the summer. The average relative humidity in mid-afternoon is about 60 percent and greater at night. The average humidity at dawn is about 80 percent. Humidity is normally 90 percent or greater in the summer months.

Rainfall is approximately 57 inches per year, and there is seldom extended accumulations of snow or ice. Precipitation is highest during the winter and lowest during the fall. Rainfall events that produce flooding are most common from mid-December to mid-April. However, heavy rainfall can be recorded anytime throughout the year and records show that the heaviest floods have occurred during summer months. Although prolonged droughts are rare, excessive dry periods in the late summer have occurred (Sherard 1971; Swenson et al., 1958; and Swenson et al., 1954).

GEOLOGY AND TOPOGRAPHY

Refuges within the Wheeler Complex are located within two physiographic provinces of the United States: the Interior Low Plateau and the Appalachian Plateau. Wheeler and Key Cave NWRs reside within the Highland Rim section of the Interior Low Plateau called the Tennessee Valley. The Tennessee Valley is characterized by broad, gently sloping areas with semi-karst topography and is underlain by 360 million-year-old Mississippian-aged limestone and shale. It is comprised of two physiographic subdivisions: The Limestone Valley (Red Lands) and the Alluvial Plains. Red Lands have undulating to rolling relief and Alluvial Plains have nearly level to undulating first bottoms and stream terraces (second bottoms) along the Tennessee River (Swenson et al., 1958).

Sauta Cave and Fern Cave NWRs reside within the Cumberland Plateau section of the Appalachian Plateau province. The surface is underlain by 330 million-year-old Pennsylvanian-aged sandstones, conglomerates, coal, and shale. Side slopes found in the higher mountain elevations are composed of older limestone and shale from the Mississippian System. Terrain features can be steep and difficult to access by vehicle. Slopes greater than 25 percent are common (Swenson et al., 1954).

Wheeler NWR

Wheeler NWR exists along the Wheeler Reservoir of the Tennessee River and is located within the Alluvial Plains physiographic subdivision. It is underlain by Tusculumbia Limestone, which is gray to blue in color and contains some interstratified chert. Exposed surface rock is unusual, except in a few isolated places. The weathering of the Tusculumbia limestone has given rise to many of the red upland soils and has developed many caves and sinkholes in the area. The general topology of the refuge is flat (0-2 percent slopes) to gently rolling (3-6 percent slopes), with a few abrupt hills (Swenson et al., 1958). Land elevations range from 560 to about 575 feet above mean sea level (MSL), except in the dewatering units where elevations may be as low as 552 feet MSL.

Key Cave NWR

Key Cave NWR exists along the northern shore of the Pickwick Reservoir of the Tennessee River and resides within the Limestone Valley physiographic subdivision. It is also underlain by Tusculumbia Limestone, whose weathering has produced many karst features, including numerous springs, sinkholes, and several underground cave systems. There are very few exposures of bedrock except for locations along the bluff line at the margin of the Tennessee River (Aley 1990). Topology is comprised of flat to gently rolling upland terraces with slopes ranging from one to fifteen percent. Elevation of the land surface generally ranges from about 500 to 580 feet above MSL (Kidd et al., 2001).

Sauta Cave NWR

Sauta Cave NWR exists along the northern shore of the Guntersville Reservoir of the Tennessee River. It is underlain by the Bangor and Monteagle Limestone formations and parts of the Pennington formation. Bangor Limestone is comprised of blue coarsely crystalline or oolitic finely granular limestone with occasional lenses of shale. It is several hundred feet thick, occurs in beds or massive layers that outcrop on mountain slopes, and provides the parent material for the hilly and rough types of limestone rockland on the refuge. Monteagle Limestone is also comprised of oolitic limestone, but contains more shale. Both the Bangor and Monteagle Limestones are well known for forming caves. The Pennington formation is a caprock for the area and consists of shale with sandstone, thin dolomite and limestone beds (Swenson et al., 1954). Elevations range from 1,140 feet MSL at the highest point on the refuge and falls to 600 feet MSL at the lowest portion near the bottom entrance to Sauta Cave.

Fern Cave NWR

Fern Cave NWR exists along the eastern edge of the Paint Rock River valley just north of the Guntersville Reservoir of the Tennessee River. It is underlain by the Bangor and Monteagle Limestone formations and parts of the Pottsville formation. The Pottsville formation is of Pennsylvanian age and is made up of a sandstone cap and an underlying bed of shale. The terrain is difficult and slopes are steep. Slopes greater than 35 percent are common (Swenson et al., 1954). The eastern-most section of the refuge starts at about 1,500 feet MSL in elevation and the northwestern edge that borders the Paint Rock River falls to about 590 feet MSL.

SOILS

The majority of the soils located on lands within the Wheeler Complex have developed from the weathering of high-grade limestone, the deposition of alluvial material from the Tennessee River, or the deposition of colluvium from weathering sandstones in the higher elevations. Soils are generally acidic, low in organic matter, and are usually fertile.

Wheeler NWR

Upland, terrace, colluvial, and bottomland soils are found on Wheeler NWR. Upland soils that occupy positions above the adjacent stream bottoms and river terraces consist of material derived directly through the decay of limestone rock in place. The properties of these soils are closely related to those of the parent rock and are underlain with clay or limestone. These soils are well to moderately drained and make up approximately 14 percent of the land acreage on the refuge. The Decatur and Dewey soil series, derived from high-grade limestone, are the reddest of the upland soils and most fertile (Swenson et al., 1958).

Terrace soils (old general alluvium) are frequently called second bottoms or benches. These soils are more mature than soils on first bottoms and have more distinct surface-soil and subsoil layers. The Capshaw, Captina, Wolftever, and Holston soil series are moderately well-drained in the upper levels but drain much slower at lower elevations (Swenson et al., 1958). These soils make up about 36 percent of the land acreage on the refuge.

Colluvial soils (young and old local alluvium/colluvium) are the sloping fans and benches at the base of slopes. They consist of a mixture of local alluvium and colluvium that has been washed or has been sloughed from higher elevations. The Abernathy, Allen, Greendale, Hermitage, and Jefferson soil series are well-drained. The Ooltewah and Guthrie soil series are somewhat poorly to poorly drained (Swenson et al., 1958). These soils only make up about eight percent of the land acreage on the refuge.

The bottomlands (floodplains) or first bottoms are nearly level areas along stream channels that are subject to frequent flooding. These soils are young and undeveloped and make up approximately 41 percent of the land acreage on the refuge. Parent material from which these soils are developing has not been deposited long enough to permit the development of surface and subsoil layers (Swenson et al., 1958). Bottomland soils found within Wheeler's dewatering/impoundment units have silt loam textures that drain very slowly. These soils may be too wet in spring to plant corn, but are usually dry enough for planting late season crops, including soybeans. The majority of these soils belong to the Melvin series, which consists of very deep, poorly drained soils formed in silty alluvium on flood plains and in upland depressions. Slopes range from zero to two percent (USFWS 1944).

Key Cave NWR

Upland soils derived from the decay of high-grade limestone rock are found on Key Cave NWR. The properties of these soils are closely related to those of the parent rock and are underlain with clay or limestone. The Decatur, Dewey, and Fullerton soil series make up approximately 80 percent of the land acreage on the refuge and have silt loam to silty clay loam textures (Sherard 1971). These soils are moderately to well drained, and depth to bedrock average between 25 and 50 feet deep (Moser and Hyde 1974). Small pockets of the Grasmere series can be found along small drainage ways and in shallow depressions. Soils in the Grasmere series drain moderately to poor and have silty-clay loam textures (Sherard 1971).

Sauta Cave NWR

Soils on Sauta Cave NWR are dominated by rough stony land, limestone rockland (rough), and limestone rockland (hilly). These soils make up over 85 percent of the land acreage on the refuge. Rough stony land (Muskingum soil material) occurs on the upper one-third of the area between sandstone plateaus and limestone valleys. Slopes (>20) are steep and soil material consists largely of colluvial accumulations of sandstone material on top of limestone.

Areas classified as limestone rockland (rough) occur in wide nearly continuous belts that include rocky slopes (>25 percent) that occur on the bottom two-thirds of the area between sandstone plateaus and limestone valleys. Soil material among the rocks consists of residue from limestone weathered in place and wash from higher elevations. External drainage is rapid except in areas where level benches are located. Small to large limestone sinks and caves are common.

The limestone rockland (hilly) series includes area of hilly land (11-25 percent slopes) with numerous limestone outcrops and large limestone boulders. This series occurs on limestone ridges below areas of limestone rockland (rough). External drainage is very rapid and internal drainage is slow. The soil material among the rocks consists of weathered limestone and shale. The depth of the soil material varies from a few inches to several feet (Swenson et al., 1954). The remaining 15 percent of the land base is composed of young soils consisting of alluvial material deposited from weathering limestone.

Fern Cave NWR

Soils on Fern Cave NWR are dominated by limestone rockland (rough) and rough stony land. These two soil series make up over 90 percent of the land on the refuge (Swenson et al., 1954). The remaining 10 percent of the land base is composed of young soils consisting of alluvial material deposited from weathering limestone. (Please see the section above for individual descriptions of each of these soil series.)

HYDROLOGY

The Tennessee River and its tributaries comprise the drainage system for the four refuges in the Wheeler Complex. The Alabama portion of the Tennessee River basin is located along what is called the "Great Bend." The name Great Bend was a Native American term adopted by early settlers to describe the arc of the Tennessee River as it reached its southern most bend in what is today Alabama (McDonald 1989). The Tennessee River basin in Alabama drains roughly 13 percent of the state's 51,705 square miles and is by far the largest river system to pass through the State of Alabama (McDonald 1989).

Wheeler NWR

The Tennessee River flows through the center of the refuge from east to west. Several tributaries flow across refuge lands into the river. The main tributaries include Flint and Cotaco Creeks on the south side and Piney, Limestone, Beaver Dam, and Indian Creeks on the north side of the Tennessee River. There are numerous other small branches. The normal pool elevation of the Wheeler Reservoir in the summer is 556 feet MSL (169.5 m). At this level, approximately 15,500 acres of open water flow within the boundary of Wheeler NWR.

Key Cave NWR

Key Cave NWR does not have any perennial streams that currently flow across the refuge. Before the Service took ownership of the land, several large erosion ditches were present. Complex management installed three shallow water areas and rehabilitated drainage channels to reduce erosion, thus enhancing the water quality for endangered species inhabiting Key Cave. A 38-acre sinkhole lake once held water on the refuge; however it has been dry since September 2000. Numerous sinkholes are found in close proximity to the refuge and are an integral component of groundwater recharge to Key Cave, Collier Cave, and Collier Bone Cave.

In 1990, the Ozark Underground Laboratory conducted a study to determine the underground recharge area for the cave system. The recharge area was divided into four potential risk areas: high hazard, moderately high hazard, moderate hazard, and low hazard (Aley 1990). The refuge resides in the high hazard risk area of the Key Cave aquifer Recharge Zone.

The recharge zone is approximately 16 square miles and is located in karst topology underlain by Tusculumbia limestone. Surface drainage is poor and essentially all runoff water enters the groundwater system by sub-surface drainage. Only a portion of the water in the Key Cave aquifer passes through Key Cave. The estimated mean annual discharge from the entire Key Cave aquifer is approximately 15 to 20 cubic feet per second (cfs). This flow rate is subject to precipitation events and can fluctuate greatly (Aley 1990). Waters from Pickwick Lake seldom, if ever, flow into Key Cave. Instead, waters from Key Cave discharge into the Lake through Coffee Slough.

Sauta Cave NWR

Surface runoff and groundwater discharge from lands within the refuge's boundaries drain into North Sauty Creek, a tributary of the Tennessee River on the Lake Gunter'sville Reservoir.

Fern Cave NWR

Surface runoff and groundwater discharge from lands within the refuge's boundaries drain into the Paint Rock River, a tributary of the Tennessee River on the Lake Wheeler Reservoir.

AIR QUALITY

Under the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has established primary and secondary air quality standards to protect public health and public welfare. Primary standards are designed to prevent the public from dangerous particulates in the air that can cause health related problems. Secondary standards relate to protecting ecosystems, including plants and animals, from harm, as well as protecting against decreased visibility and damage to crops, vegetation, and buildings.

EPA has set National Ambient Air Quality Standards (NAAQS) for six principal air pollutants (referred to as “criteria pollutants”): Particulate Matter (PM), Sulfur Dioxide (SO₂), Ground-Level Ozone (O₃), Nitrogen Dioxide (NO₂), Carbon Monoxide (CO), and Lead (Pb). Areas of the country that are as of yet unable to meet these federal clean air standards are referred to as “non-attainment” areas (TVA 2003).

The Air Division of the Alabama Department of Environmental Management (ADEM) monitors all of these pollutants for counties in the State of Alabama. The closest monitoring stations located near refuges within the Wheeler Complex are located in Colbert, Madison, and Morgan Counties. In general, data from 2004 indicate that the Alabama counties within the Tennessee River Valley are meeting all of the NAAQS and have recently been designated in attainment with the new 8-hour ground-level ozone and fine particulate matter (PM_{2.5}) standards (TVA 2003). In fact, Huntsville is presently an attainment area for all federal air quality standards (City of Huntsville 2004).

However, the Huntsville area remains close to the 8-hour ozone and fine particle standards, which were promulgated by EPA in 1997. The revised ozone standard is more stringent than the former 1-hour standard, and attainment of the new fine particulate matter standard (the PM_{2.5} NAAQS) is similarly far more difficult than attainment of the PM₁₀ standard. In the Huntsville area, ongoing pollution control efforts and favorable meteorological conditions over the past three years have resulted in ambient pollutant concentrations below the levels specified in the new federal standards (City of Huntsville 2004).

WATER QUALITY AND QUANTITY

The Water Division of ADEM is responsible for monitoring and maintaining water quality and controlling water pollution in the State. Its 2006 Integrated Water Quality Assessment and Monitoring Report indicated that overall Alabama’s surface water is of high quality (ADEM 2006). This report also stated that water management programs are conducted on a basin-wide scale and that water quality monitoring of lakes of the Tennessee River system are conducted by the Tennessee Valley Authority Reservoir Vital Signs Monitoring Program. This program provides monitoring results to ADEM on an annual basis (ADEM 2006). Open water is controlled entirely by TVA in its flood control and power production operations; however water confined to dewatering/impoundment units on Wheeler NWR are controlled by the Service.

Refuges in the Wheeler Complex are located within the Wheeler, Pickwick, and Guntersville Reservoirs of the Tennessee River. Wheeler Reservoir was monitored annually by TVA from 1991 through 1995 to establish baseline data on the Reservoir’s ecological health under a range of weather and flow conditions. Wheeler Reservoir is now monitored every other year. The ecological health condition of Wheeler Reservoir was rated “good” in 2005 and “fair” in 2003. The rating in 2003 was only one point below a rating of good (TVA 2006). Although the overall ecological condition of Wheeler Reservoir also was fair in 1999 and 2001, the 2003 score was notably higher. Generally, lower ecological health scores occur during years with lower flows as a result of higher chlorophyll concentrations and lower dissolved oxygen levels (TVA 2006).

Pickwick and Guntersville reservoirs were monitored annually by TVA from 1991 through 1994 to also establish baseline data. Pickwick and Guntersville Reservoirs are now evaluated every other year. The overall ecological condition of both Pickwick and Guntersville Reservoirs was rated as good in 2004 (TVA 2006). As in past years, the ecological health indicator scores for Guntersville Reservoir were among the highest observed for all TVA reservoirs (Dycus and Baker 2000).

The Clean Water Act of 2001 requires that each state identify those waters that do not currently support designated uses and establish a priority ranking of these waters by taking into account the severity of the pollution and the designated uses of such waters. The result of this requirement is the development of Alabama's §303(d) list, which includes segments of rivers, streams, lakes, reservoirs, and estuaries that do not fully support their currently designated use or uses. The 2002 ADEM §303(d) list identified 63 stream segments, comprising 650 miles in the Tennessee River Basin with impaired water quality. This amount far exceeds any other river basin in Alabama. Most impairment has been attributed to organic enrichment, siltation and pathogens, all from an agricultural origin (ADWFF 2005).

Wheeler NWR

Activities impacting both water quality and quantity are increasing on Wheeler NWR. Water quality is a major human and wildlife concern because of the number of people in the area who depend on drinking water from the Tennessee River or its tributaries and because of the number of fish and wildlife species that are directly dependent on high water quality.

Since the late 1980s, the Tennessee River has been considered one of the ten most polluted rivers in the country. Its status was related to point source pollution from industries and non-point source pollution from residential development and agricultural practices. Four water bodies that flow through Wheeler NWR are currently found on Alabama's 2006 §303(d) list: Huntsville Spring Branch, Indian Creek, Cotaco Creek, and Beaverdam Creek (ADEM 2006). See Table 2 for a complete description of causes and sources of impairment.

Table 2. Select data from Alabama's 2006 §303(d) list

| Assessment Unit ID | Waterbody Name | County | Uses | Causes | Sources | Date* |
|---------------------|--------------------------|---------|----------------------------|-------------------|--|-------------|
| AL06030002-0306-100 | Beaverdam Creek | Madison | Fish and Wildlife | Siltation | Non-irrigated crop production and land development | 1994 - 1995 |
| AL06030002-0502-101 | Huntsville Spring Branch | Madison | Fish and Wildlife | Priority Organics | Contaminated sediments | 1993 |
| AL06030002-0505-101 | Indian Creek | Madison | Fish and Wildlife | Pesticides (DDT) | Contaminated sediments | 1991-1993 |
| AL06030002-0603-102 | Cotaco Creek | Morgan | Swimming Fish and Wildlife | Pathogens | Agriculture | 1997 |

*Date corresponds to the year in which the waterbody was placed on the §303(d) list (Source: Alabama Department of Environmental Management 2006)

To monitor water quality at Wheeler NWR, water samples are taken semi-annually (in April and September/October) at nine sites, which are then subjected to biochemical analysis. Samples are analyzed in the spring for specific conductivity, hardness, sulfate, alkalinity, pH, turbidity, phosphorus, and nitrate. In addition, cadmium, copper, zinc, nickel, and manganese analyses are conducted on fall samples.

Water quantity/water rights issues continue to be discussed by local farmers and local municipalities. The introduction of irrigation into a once dryland farming system in the Tennessee River Valley has increased. Ten years ago, large scale irrigation was virtually nonexistent. Over the past five years, there have been four requests from area farmers for permission to place irrigation systems within refuge waters to irrigate their adjacent crops. In addition, population levels have exploded in local cities surrounding the refuge. Several requests have been made to cross the refuge and extract water out of the Tennessee River for public consumption.

Key Cave NWR

In 2001, the Service installed semi-permeable membrane devices (SPMD) for water sampling inside Key Cave. These devices consist of low-density polyethylene tubes filled with triolein (fish lipid). The device sequesters lipid-soluble contaminants (i.e., organochlorines, PAH, pyrethroids, and several herbicides) from the water column. They may be left in place for extended periods of time; therefore the devices are effective in detecting contaminants at very low concentrations and at capturing episodic events (e.g., temporary increases in contaminant concentrations due to stormwater runoff). The SPMDs were retrieved and replaced in the Cave every two months (six times per year) in order to develop baseline water quality data. At the time of this publication, the samples have not yet been analyzed.

Water quantity measurements for the Key Cave aquifer have been conducted in the past by other agencies; however accurate data are unavailable at this time.

Sauta Cave NWR

Water quality assessments and monitoring are not conducted on Sauta Cave NWR at this time. Water quantity measurements for local aquifers have been conducted in the past by other agencies; however, accurate data are unavailable at this time.

Fern Cave NWR

Water quality assessments and monitoring are not conducted on Fern Cave NWR at this time. Water quantity measurements for local aquifers have been conducted in the past by other agencies; however, accurate data are unavailable at this time.

BIOLOGICAL RESOURCES

Refuges in the Wheeler Complex are located in the Tennessee River basin of Alabama. According to The Nature Conservancy, the Tennessee River basin is the most biologically diverse river basin for aquatic species in North America (ADWFF 2005). In fact, 163 fish species have been documented in the Alabama portion of the Tennessee River basin, 73 of which do not occur in other Alabama drainages. Furthermore, 90 species of freshwater mussels and 66 species of aquatic snails are found in the Alabama reaches of the Tennessee River basin. Of those, 73 mussels and 51 snails occur in no other Alabama drainage system (Boschung and Maden 2004).

HABITAT

The Wheeler Complex is home to a variety of valuable habitats that support migratory birds, resident mammals, reptiles, amphibians, threatened and endangered species, and imperiled species. Some of the habitats include: the Tennessee River and its tributaries, where listed mussels and snails occur; karst/cave systems that support many rare and imperiled species both inside and at their entrances; wetlands that support a variety of migratory waterfowl; and, forests that provide nesting

and breeding habitat for a variety of migratory birds. Most of the land base surrounding each refuge is devoted to farming, forestry, and/or industry. When compared to other areas of Alabama, relatively little natural habitat remains in the Tennessee River basin. For example, impoundments on the Tennessee River, such as the Wilson, Wheeler, and Gunter Reservoirs, have virtually eliminated all free-flowing riverine habitats (ADWFF 2005). The following section describes each of the habitats found at the individual refuges.

Wheeler NWR

Many different types of habitats are found on Wheeler NWR. Because the Tennessee River runs directly through the middle of the refuge, almost all habitats are influenced by water or have been influenced by the river in the past. Currently, Wheeler NWR consists of approximately 37,200 acres, including 25,950 acres of land and 11,250 acres of open water, streams, and creeks.

The land acreage consists of approximately 14,000 acres of forested wetlands and 3,000 acres of upland or mesic hardwoods, with the main tree species consisting of red and white oaks, hickories, poplar, ash, and tupelo gum; 2,000 acres of swamp; 1,000 acres of pine plantations, much of this was subjected to sanitation cuts in the mid-1990s; 3,800 acres of managed cropland; 2,000 acres of wetlands (impoundments), in which water levels are manually controlled; and 150 acres of old fields, with the remainder including native warm-season grass fields, karst formations (caves), open shelves, mudflats, backwater embayments, ephemeral ponds, rocket test ranges, and other areas (Figure 8). All of these habitats help provide for a large diversity of wildlife on the refuge.

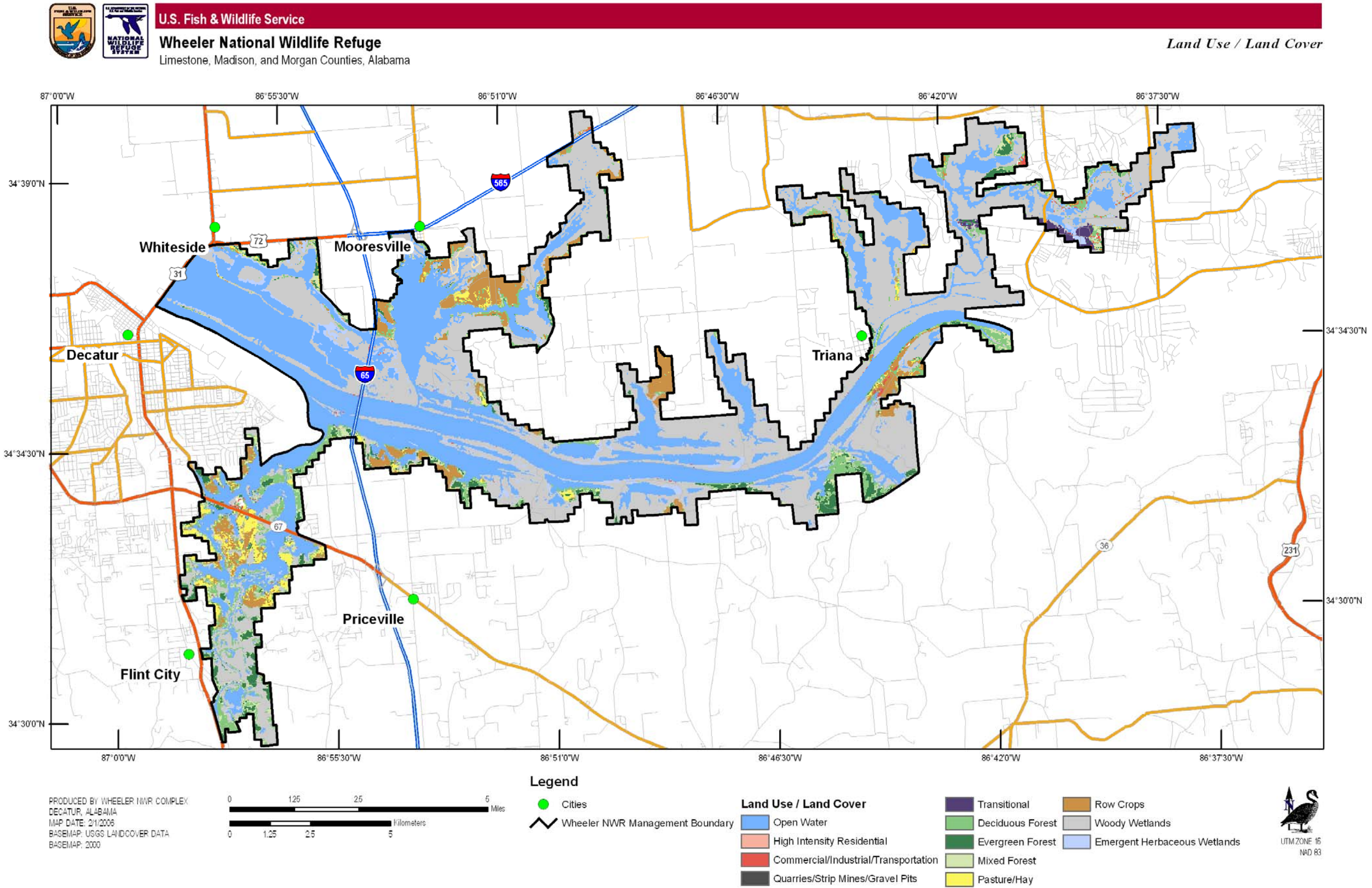
Cropland

Cooperative farming is a mutually beneficial arrangement where the farmer is allowed to farm refuge land under certain guidelines and restrictions, including location of crops, techniques, crops planted, and chemicals used. Title 50, Part 29, of the Code of Federal Regulations and Service policies require that the value of a refuge's share of cooperatively grown crops be set at rates that reflect the fees and charges received by private landowners in the vicinity for similar privileges. The value can be established through the use of competition in selecting cooperators or through an analysis of local market conditions to establish the prevailing rates in the nearest comparable area.

Wheeler NWR has an active cooperative farming program in which about 3,000-3,900 acres are planted annually. The goal of the program is to provide food and cover for migratory birds and other resident wildlife. The program supplements natural foods with grain foods, such as corn, milo, small seeded millets, and green browse. It is designed for farmers to buy the seed, plant, grow, and harvest the crop and leave a certain portion or share for the wildlife. Corn is usually chosen for refuge shares, although millet is planted in areas that remain wet too long for corn production.

Recently, refuge shares have been about 20 percent of the crop, however in 2007 the refuge share was changed to 18 percent. Yearly averages of 4,150 acres have been planted in the last five years by seven cooperative farmers, including some acreage by force account (using staff labor and equipment). Force account farming has included planting wheat in harvested corn fields for green browse.

Figure 8. Land use/land cover for Wheeler National Wildlife Refuge



Waterfowl Impoundments

Wheeler NWR manages 16 impoundments to provide approximately 2,000 acres of waterfowl habitat in open water, moist soil, and in areas where agricultural crops can be flooded (Figure 9). Management consists of manipulating water flows through 20 water control structures (WCS) consisting of concrete and/or corrugated metal pipes with flash board riser or screwgate structures. By adjusting the height of the control mechanism (screwgates and riser stoplogs), water levels are set and gravity-induced water flows can be created. In addition, many of the impoundments are located within two large dewatering units (White Springs and Rockhouse Buckeye) that utilize mechanical pumps to remove water.

Generally, impoundments are filled in the fall by rainfall or through spring seepage. Rarely can the refuge open WCSs and allow water to flow from the Wheeler Reservoir into the impoundments because the reservoir's water level has dropped (early to mid-September) prior to the time when filling is needed (late September or early October). Impoundments are not filled with water until farmers harvest crops and just prior to the time birds begin to arrive at the refuge.

Most impoundments, with the exception of the Display Pool at the Visitor Center, can usually be drained or partially drained by gravity into the reservoir or its tributaries before the water level is raised in the spring (early to mid-April) by opening various WCS. A portable pump is used to empty the Display Pool. Impoundment drawdown is initiated after waterfowl leave, generally in late February or March, depending on the impoundment and yearly conditions. In typical years, water has to be pumped out of the impoundments after the reservoir is raised in mid-April.

In the spring, pumps are used to draw down the White Springs Dewatering Unit (Whiteside Pump Station) and the Rockhouse Buckeye Dewatering Unit (Rockhouse Pump Station). These pumps are operated by TVA in cooperation with the refuge and the State of Alabama (the pumps also affect management units on the Swan Creek Wildlife Management Area just west of the White Springs unit) via a cooperative agreement. The costs are paid by the Service or cost-shared as follows: Whiteside Pump Station - May 1 to September 1 - State 20 percent, TVA 50 percent, and Service 30 percent; Rockhouse Pump Station - May 1 to September 1 - TVA 50 percent and Service 50 percent. The refuge pays 100 percent of pumping costs during the rest of the year when pumps are operated to dewater the units.

Impoundments and related structures are maintained annually as resources and conditions permit. When soil conditions are dry enough, unwanted vegetation (especially woody vegetation) is mowed, disced, or removed. Roadsides and the upper, dryer portion of the dikes are mowed annually. Areas that are farmed do not require as much maintenance.

Swamps

Swamps are regularly flooded forested areas dominated by cypress, tupelo, and wetland oaks, often with substantial shrub or herbaceous vegetation. Approximately 2,000 acres of swamp habitat is located on Wheeler NWR. The largest swamp on the refuge, Blackwell Swamp is located on the north side of the river just west of the Redstone Military Installation boundary. As stated earlier, a 30-acre tupelo gum swamp, located on the north side of the Tennessee River along Beaverdam Creek on Wheeler NWR, was officially designated as a National Natural Landmark in 1974. This habitat is unique because this tupelo gum swamp occurs in the Interior Low Plateau physiographic region, rather than its usual occurrence in the Gulf Coastal Plain region.

Forested Wetlands/Floodplain Forest

Forested wetlands or floodplain forests differ from true swamps in that they lack continuously standing water, although repeated flooding is common. Differences in the length of inundation give rise to a variety of community types within this classification. For example, large timbered areas bordering rivers with frequent flooding often have a poorly developed, very open understory. Red maple, sycamore, and cottonwood are common, and the forest floor is littered with rotting logs and woody debris deposited by flood water.

In contrast, areas higher in elevation, where flooding events are not as prolonged, have a greater diversity of plant species, with oaks, and hickory common in the canopy. The forest floor in these areas is often covered by a variety of annual and/or perennial plants. Wheeler NWR has approximately 14,000 acres of forested wetlands, including both of these community types.

Dry (Upland) Hardwood Forest

Upland forests occur in higher elevations where drainage is sufficient so that soils do not become saturated for extended periods of time. Water can either run off or percolate through the soil. In natural upland forests, the upper canopy is normally 80 to 100 percent closed, and sub-canopies of younger trees and shrubs typically exist. The herbaceous ground layer includes forbs, grasses, lichens, and mosses. Wheeler NWR has approximately 2,000 acres of upland forest with species composition consisting primarily of oak and hickory with a few scattered southern pines.

Mesic Hardwood Forest

Mixed deciduous hardwood or hardwood-planted pine forests, with canopy closures exceeding 40 percent, occur on slopes and ravines between dry upland terraces and stream bottoms. Most of the mesic hardwood forest habitat on Wheeler NWR, approximately 1,000 acres, is highly fragmented and consists of young successional forest. In addition, approximately 1,000 acres that traditionally would have contained mesic hardwood forests have been converted to loblolly pine stands.

Karst Formations (Caves and Sinkholes)

Caves are unique environments that house rare wildlife species, mineral formations, and valuable ground water resources. Caves in the Tennessee River basin are generally formed by water dissolving away limestone over long periods of time. The dissolution process produces a distinctive landform known as karst, characterized by sinkholes, sinking streams, and underground drainage. Limestone caves are often adorned with calcium carbonate formations produced through slow precipitation, including the most common and well-known stalactites and stalagmites. Caves located on Wheeler NWR include: Cave Springs, Copperhead, and Rockhouse; a number of small caves around the Rockhouse Cave; and at least one other known cave just east of Bluff City along the river.

Old Fields

Wheeler NWR manages certain tracts of land as old fields. Old field habitat is the stage of plant growth between bare ground and forest. On Wheeler NWR, old fields are commonly found on abandoned or retired cropfields. Typical plants include foxtail, goldenrod, broom sedge, and ragweed. Old fields also often contain scattered woody vegetation, such as dogwood or plum shrubs and blackberry briars. Currently, the refuge contains about 150 acres of old field habitat that is maintained in an early successional stage of grasses, brush, and small trees. These fields are mowed and disked to maintain them in an early successional stage.

Figure 9. Waterfowl impoundments managed at Wheeler National Wildlife Refuge

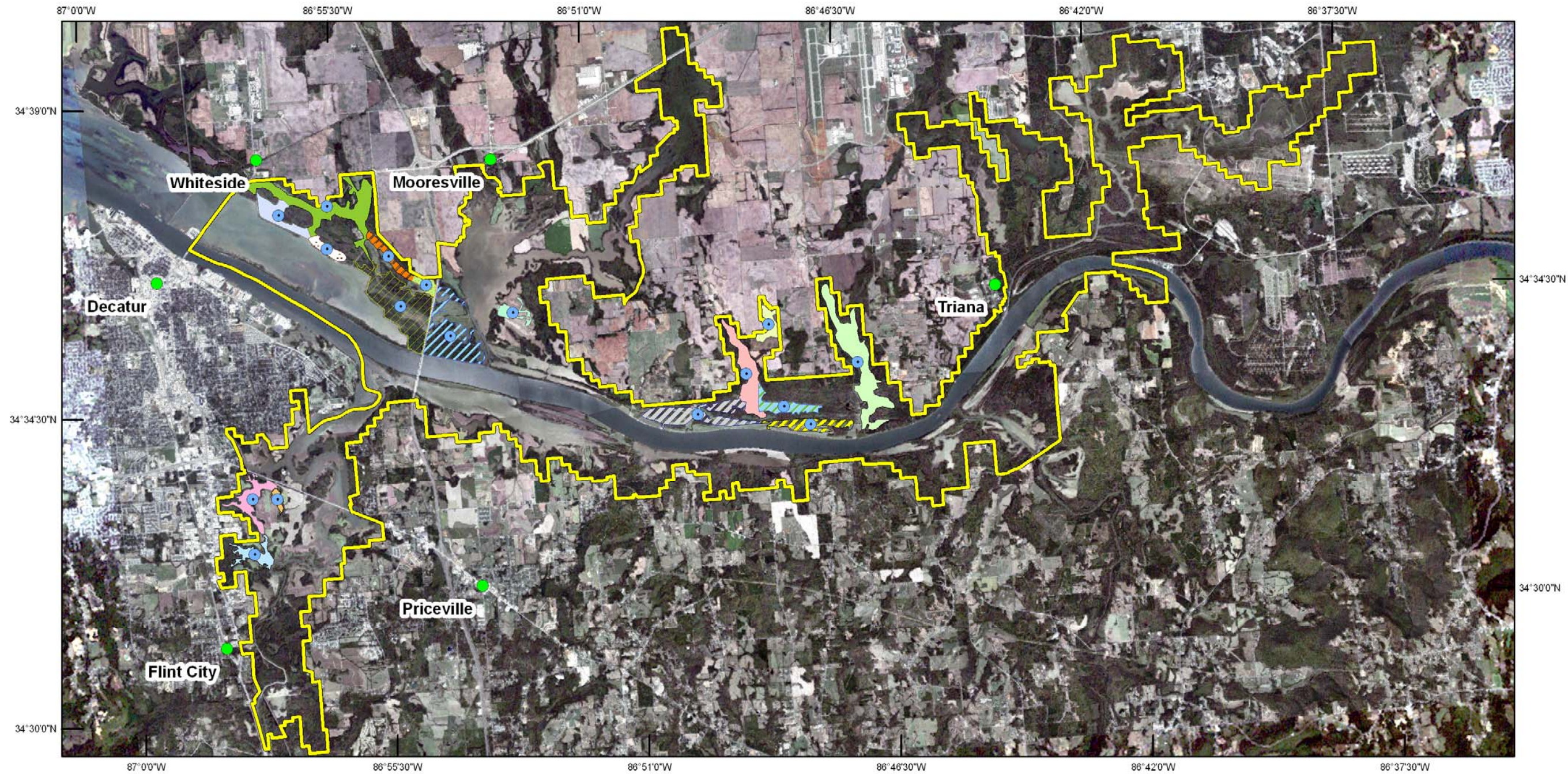


U.S. Fish & Wildlife Service

Wheeler National Wildlife Refuge

Limestone, Madison, and Morgan Counties, Alabama

Locations of Waterfowl Impoundments



PRODUCED BY WHEELER NWR COMPLEX
 DECATUR, ALABAMA
 MAP DATE: 2/1/06
 BASEMAP:



Legend

- Water Control Structures
 - Cities
 - Wheeler NWR Management Boundary
- | | | | |
|-----------------|-----------------|--------------------|-------------------|
| Blackwell Swamp | Dinsmore Slough | Thorson Arm | White Springs # 5 |
| Buckeye | Display Pool | White Springs # 2 | White Springs # 6 |
| Crabtree Slough | Penny Bottoms | White Springs # 3 | White Springs #1A |
| Devany Tract | Rockhouse # 1 | White Springs # 1B | |
| | Rockhouse # 2 | White Springs # 4 | |



Grasslands

Fields of grassy cover with scattered trees or shrubs (less than 10 percent canopy cover by these woody species) are considered grasslands. Grasslands can usually be classified into categories based on growing characteristics and the composition of their herbaceous vegetation. Recently, Wheeler NWR established one small (4-acre) tract of native warm season grasses (NWSG). These grasses are native to areas where vegetative growth occurs during the warm months (June, July, and August) and are dormant during autumn and winter. They provide excellent habitat for several grassland-dependent bird species and other wildlife. Grasslands planted in NWSGs at Wheeler NWR are mowed and disked to maintain them in an early successional stage. Grass species planted include big bluestem, little bluestem, Indiangrass, sideoats gramma, switchgrass.

Open Water

Approximately 11,250 acres of Wheeler NWR contain open water habitat consisting of the Tennessee River channel, Tennessee River backwater, Limestone Bay, Garth Slough, Flint Creek, Limestone Creek, Piney Creek, Beaverdam Creek, Leemon Slough, Lilly Pond, Crowder Slough, Cotaco Creek, Huntsville Spring Branch, and Indian Creek.

Key Cave NWR

Key Cave NWR contains 1,060 acres of land consisting of rolling hills, upland forests, and cropland. Currently, approximately 295 acres are in row crop production (corn, soybeans, or wheat) under a Cooperative Farming Agreement, 327 acres are in early successional fields or NWSG (big bluestem, little bluestem, indiangrass, sideoats gramma, switchgrass, and eastern gamagrass), 122 acres of former cropland have been planted in hardwoods, 30 acres of erosion drainages are being restored to grassland or hedgerow habitat, 16 acres are managed as shallow water areas, 75 acres are being converted to an oak savanna, and the remaining 195 acres consist of upland forested land dominated by oaks and hickories (Figure 10).

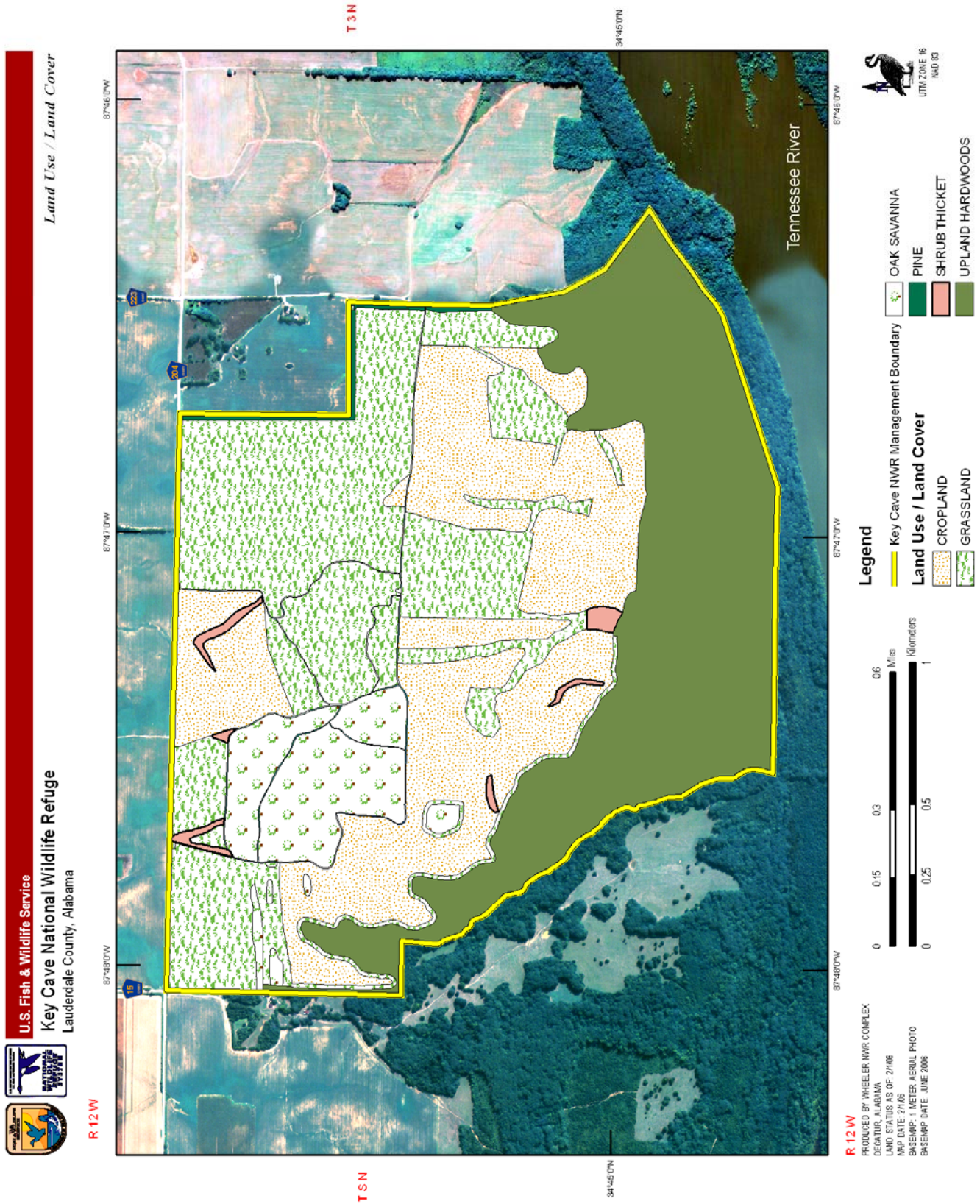
Karst Formations (Caves and Sinkholes)

Key Cave NWR is located in an area of karst topology that has numerous sinkholes and caves that surround the refuge. When the refuge was first established in 1997, it had a 38-acre sinkhole pond on the property. However, the sinkhole has been dry since September 2000, only holding a small amount of water for very short durations. Just south of the property boundary for Key Cave NWR lies the entrance to Key Cave. To the southeast of the refuge lie the entrances to Collier Cave and Collier Bone Cave. All three cave entrances are located on lands owned by TVA and are sometimes underwater when the Pickwick Reservoir is flooded.

Shallow Water Areas

In 1999, two small (1-2 acre) shallow water areas (SWAs) were constructed to capture runoff surface water within grassed waterways. Then during late 2001 and early 2002, a larger (approximately 10-acre) SWA was constructed, which included a 700-foot dike and a 24-inch screwgate WCS. All of these SWAs were designed to provide habitat for waterfowl and other wetland associated wildlife, as well as to capture silt from erosion before it enters the Key Cave aquifer. However, none of the SWAs on Key Cave NWR have held much water since they were constructed.

Figure 10. Habitat coverage for Key Cave National Wildlife Refuge



Dry (Upland) Hardwood Forest

As of this date, a Forest Management Plan has not been developed for Key Cave NWR, but as per the June 18, 1997 Regional Reforestation of Federal Lands Memorandum, the refuge has reforested approximately 122 acres along the refuge's southern boundary. Native hardwoods, such as white oak, northern red oak, water oak, Shumard oak, cherrybark oak, common persimmon, and flowering dogwood, were planted with the help of volunteers. Including this additional acreage, Key Cave NWR has approximately 317 acres of upland hardwood forests.

Oak Savanna Forest

An oak savanna forest is a community of 10 percent or more scattered oak trees and shrubs above a layer of grasses and forbs. The trees are spread out so that there is no closed canopy and the grasses and forbs receive plenty of sunlight. It is a transition ecosystem between grassland and woodland environments, so it is an important habitat for both woodland and prairie species. On Key Cave NWR, a 75-acre oak woodlot tract is currently being converted to oak savanna habitat to help promote a diversity of wildlife species.

Cropland

Currently at Key Cave NWR, one farmer plants approximately 295 acres annually through a cooperative farming agreement in which a portion of the crop remains in the fields as rent. Rent portions and crops grown are similar to the farming program at Wheeler NWR to support a variety of wildlife.

Grasslands

Native warm season grassland (NWSG) restoration has been on-going since the establishment of Key Cave NWR in 1997. Currently, approximately 327 acres of NWSG consisting of big bluestem, little bluestem, indiagrass, sideoats gramma, switchgrass, and eastern gamagrass are maintained for management of grassland-dependent and early successional species. Prescribed fire is used to maintain the NWSG.

Sauta Cave NWR

Sauta Cave NWR consists of 264 acres of forested lands, primarily dominated by oak, elm, dogwood, maple, sweetgum, poplars, and hickory tree species with small amounts of scattered pines at the higher elevations. Habitats include dry upland hardwoods, mesic hardwoods, bottomland hardwoods, and rockhouses. Upland hardwoods are found on the higher elevations at the refuge and mesic hardwoods occur in somewhat protected landscape positions, such as coves and lower slopes or north-facing slopes. Bottomland hardwoods are located along the lower elevations and wetter areas of the refuge.

Sandstone and limestone escarpments and cave-like rockhouses are found on steep slopes and contain sparse vegetation, including lichens, ferns, and small woody shrubs. There are two cave entrances to Sauta Cave: an upper entrance and a lower entrance. A small stream exits the lower cave entrance and flows northeast into the North Sauty Creek embayment of the Guntersville Reservoir.

Fern Cave NWR

Fern Cave NWR consists of 199 acres of forested hillside, which are primarily dominated by oak, elm, dogwood, maple, sweetgum, poplars, and hickory tree species with small amounts of scattered pines at the higher elevations. The hillside is underlain by a massive cave with many stalactite and stalagmite-filled rooms. The cave has five entrances with four occurring on the refuge. Upland hardwoods are found on the higher elevations at the refuge and mesic hardwoods occur in somewhat protected landscape positions, such as coves and lower slopes or north-facing slopes. Bottomland hardwoods are located along the lower elevations and wetter areas.

Sandstone and limestone escarpments and cave-like rockhouses are found on steep slopes and contain sparse vegetation. A small portion, approximately 1,100 feet, of the Fern Cave NWR boundary is bordered on the west by the Paint Rock River. The Paint Rock River is one of the most biologically important water resources for both aquatic and plant and animal associations in the state. The Paint Rock River supports an extremely diverse array of aquatic life, including some 100 species of fish and about 45 different mussel species.

WILDLIFE

Refuges within the Wheeler Complex provide crucial habitat for an extremely large variety of wildlife. In fact, the Complex is home to an array of interesting flora, a bird list of 285 species, 115 species of fish, 71 species of amphibians and reptiles, 46 species of mammals, 38 species of freshwater mussels, and 26 species of freshwater snails. In addition, refuges within the Complex are home to 12 federally listed threatened or endangered species. A complete biographical listing of species found on all of the refuges within the Wheeler Complex is documented in Appendix I. The following section describes some of the typical wildlife species found at each individual refuge in the Wheeler Complex.

Wheeler NWR

Waterfowl

Considered the eastern most national wildlife refuge of the Mississippi Flyway, Wheeler NWR annually supports Alabama's largest concentration of wintering waterfowl. In the past, the refuge has supported up to 60,000 geese and nearly 125,000 ducks, although modern peaks until 1990 are nearer 30,000 geese and 75,000 ducks. Since 1990, winter goose populations have dropped dramatically: below 15,000 from 1990-1995, near 5,000 from 1995-1999; and near 2,000 since 1999. Snow geese are now the most prominent component of the winter goose population, peaking near 2,500 in December 2005 (Table 3).

Ducks

Wintering duck species common to the Wheeler NWR include northern pintail, blue-winged teal, green-winged teal, American black duck, mallard, gadwall, American wigeon, canvasback, redhead, ring-necked duck, lesser scaup, hooded merganser, northern shoveler, and wood duck (migratory and resident). Mallards are the most abundant wintering species, followed variously by gadwall, green-winged teal, American wigeon, northern pintail, northern shoveler, ring-necked duck, and hooded merganser. Wood ducks are common nesters in the spring and summer months.

During the October 2005 – March 2006 waterfowl survey season, the highest number of ducks (56,655) occurred in early January 2006. This number was higher than the highest number of ducks (39,810) observed in early January 2005. The high numbers were still observed during the time frame that was typical in the past – late December through early January.

Table 3. Ground waterfowl survey results for the 2005 – 2006 season at Wheeler NWR

| Date | Ducks | Canada Geese | Snow Geese |
|-------------|--------|--------------|------------|
| October 18 | 745 | 78 | 0 |
| November 1 | 3,498 | 243 | 200 |
| November 22 | 23,136 | 469 | 800 |
| December 13 | 46,556 | 932 | 1,805 |
| December 27 | 54,707 | 784 | 1,800 |
| January 10 | 56,655 | 1,360 | 1,900 |
| January 24 | 20,022 | 614 | 200 |
| February 7 | 28,042 | 979 | 1,000 |
| February 21 | 21,275 | 57 | 0 |
| March 7 | 3,817 | 0 | 0 |

Resident wood ducks are common with breeding/production probably being limited by natural and artificial cavities and quality brood habitat. Currently, there are approximately 226 wood duck boxes in good condition on Wheeler NWR. General maintenance and production checks of these boxes are conducted annually. The refuge also conducts pre-season wood duck banding (Table 4).

Table 4. Wood ducks banded in 2005 at Wheeler NWR

| AGE/SEX Class | Number Banded | Banding Quota |
|----------------|---------------|---------------|
| HY* - Female | 66 | 66 |
| HY - Male | 78 | 48 |
| AHY** - Female | 89 | 40 |
| AHY -Male | 49 | 22 |
| Total | 282 | 176 |

*HY - Hatch Year

**AHY - After Hatch Year

Geese

Currently, the most numerous goose species present are snow geese, Canada geese, and white-fronted geese, respectively. Snow goose numbers are increasing, but have begun to stabilize in the past few years. The highest number of snow geese observed in the 2005 – 2006 waterfowl season was 1,900, which is a slight drop from the highest number observed in the 2004 – 2005 season (2,400). The highest one-day number of Canada geese recorded in the 2005 – 2006 season was 1,360, which is lower than the 1,975 number recorded in 2004 - 2005. Both recordings are a decline from the high number of Canada geese observed from the previous five years (1998-2002), which has been between 2,000 and 4,000 birds. This is also a decline from the numbers counted from 1993-1997, which were between 2,900 and 23,000. The decreasing trend of Canada geese using Wheeler NWR continues.

Sandhill cranes

In contrast to Canada geese, sandhill crane numbers are increasing at Wheeler NWR. Prior to 1997, sandhill cranes occurred in small numbers on the refuge. In 1997, 26 sandhill cranes were observed and by 2002 the number wintering on the refuge had increased to almost 400. In 2005-2006, a peak count of 1,800 sandhill cranes was documented by refuge staff.

Sandhill cranes generally use agricultural fields on Mooresville and Beaverdam Peninsulas, Penny Bottoms, and Flint Creek Island to forage and roost in the shallow waters of Limestone Bay and Flint Creek.

Waterbirds

Waterbirds (colonial waterbirds, marsh birds, and shorebirds) can be found in waterfowl impoundments, canals, creeks, mudflats, and swamps, as well as along the shores of the Tennessee River throughout the year on Wheeler NWR.

Colonial Waterbirds

Colonial waterbirds are a conspicuous component of the wildlife assemblage at Wheeler NWR. Species commonly encountered using refuge wetlands include great blue heron, great egret, little blue heron, cattle egret, green heron, black-crowned night heron, and yellow-crowned night heron. Less commonly seen species include least bittern, snowy egret, tricolored heron, white ibis, and glossy ibis. Historically, anhingas were seen in small numbers throughout the summer and nested in Beaverdam Swamp in 1950. Wood storks were frequently seen during their post-breeding dispersal in late summer, but recent records are few.

A large heronry containing 250-300 great blue heron and great egret nests each was active in Beaverdam Swamp through 1951, though the heronry was abandoned shortly thereafter. Speculation at that time was that colony abandonment was related to DDT contamination. In 2003, a small nesting colony of 10-15 great blue heron nests was discovered near Blackwell Swamp. By the summer of 2006, the number of great blue heron nests had increased to near 40 and, for the first time since 1951, 8 to 10 great egret nests were discovered. Species known to now nest on the refuge include great blue heron, great egret, green heron, and yellow-crowned night heron.

Another large mixed heronry near the refuge at Swan Creek Wildlife Management Area was discovered in 1962. Species nesting included great blue heron, great egret, snowy egret, little blue heron, tricolored heron, cattle egret, and black-crowned night heron. At peak nesting during 1962-1963, several thousand nests were noted. The nesting site was abandoned in 1965 for reasons unknown.

Marsh Birds

Marsh birds, due to their secretive habits, are infrequently encountered, but do occur in good numbers during migration on Wheeler NWR. Smaller numbers occur during winter and summer, with a few probably nesting in refuge moist-soil areas and impoundments. The most commonly seen species include: American bittern, least bittern, Virginia rail, sora, and American coot. Least bitterns and American coots nest sporadically; king rails have nested on at least two occasions; and, nesting by common moorhens has been suspected in the past.

Shorebirds (Including American Woodcock)

Shorebirds migrate through the Tennessee River Valley from the southernmost parts of South America to the northernmost part of North America. They typically probe in soft mud and shallow water for invertebrates. These birds generally move through the area during spring and fall, foraging as they migrate. Few shorebirds nest on Wheeler NWR, while fair numbers overwinter. Shorebirds commonly seen on or adjacent to the refuge during migration include black-bellied plover, semipalmated plover, killdeer, greater yellowlegs, lesser yellowlegs, solitary sandpiper, spotted sandpiper, semipalmated sandpiper, western sandpiper, least sandpiper, pectoral sandpiper, dunlin, short-billed dowitcher, and Wilson's snipe.

In winter, killdeer, greater yellowlegs, lesser yellowlegs, least sandpiper, dunlin, and Wilson's snipe are common. The only species commonly nesting on the refuge is killdeer. American woodcock nests in small numbers almost annually, while the spotted sandpiper nests sporadically. The mudflats and shallow water areas of Limestone Bay; Garth Slough; the Tennessee River and its backwaters; and the impoundments within the White Springs units, Buckeye units, Penny Bottom units, and other similar areas are the most important refuge shorebird habitats.

American Woodcock are migratory game birds that occur throughout the forested portions of the eastern United States. The abundance of woodcock on the refuge has not been quantified to date, but it should be present in suitable habitat. Wintering habitat includes moist bottomland hardwood forests with brush and understory, especially those in close association with agricultural fields and old field succession. The scrub-shrub and dense habitats found in certain portions of the refuge provide good daytime cover for woodcock.

Landbirds

The tremendous variety of habitat types found on Wheeler NWR supports an amazing diversity of landbirds. Many landbird species of concern are found in refuge habitats in all or a large portion of their migration, nesting, and/or wintering seasons. Landbird abundance is dependent on habitat condition, weather, distribution, and amount of food and water.

Forest Birds

Despite being highly fragmented, hardwood forests of the Tennessee River basin play an important role in providing migration, food sources, and breeding habitat for forest birds. Forest bird species of concern found on Wheeler NWR include cerulean warbler, worm-eating warbler, wood thrush, Kentucky warbler, Louisiana waterthrush, whip-poor-will, yellow-throated vireo, Acadian flycatcher, American woodcock, chimney swift, eastern wood-pewee, yellow-billed cuckoo, blue-gray gnatcatcher, great crested flycatcher, and sharp-shinned hawk. Riparian zone species of concern include Swainson's warbler, prothonotary warbler, belted kingfisher, and green heron. Early successional forest species of concern include blue-winged warbler, prairie warbler, field sparrow, white-eyed vireo, yellow-breasted chat, brown thrasher, and eastern towhee.

Grassland Birds

Habitat loss is widely recognized as the primary reason that several grassland-dependent bird species have experienced dramatic declines in population throughout the southeastern United States. Grassland bird species of concern found on Wheeler NWR include Henslow's sparrow, grasshopper sparrow, and eastern meadowlark.

Scrub-Shrub Birds

Scrub-shrub (or early successional) associated birds are another group of bird species that are considered vulnerable. Scrub-shrub habitat is limited on Wheeler NWR; however, good opportunities may exist to increase acreage by establishing edges around agricultural fields. Scrub-shrub bird species of concern found on Wheeler NWR include prairie warbler, field sparrow, yellow-breasted chat, brown thrasher, northern bobwhite, and eastern towhee.

Mammals

Mammals occurring on the Wheeler NWR represent most species that are found in the Tennessee River Valley and that are usually associated with bottomland hardwood forests and wetlands. Large mammals include white-tailed deer and feral hog (an invasive species). Medium-sized mammals include opossum, armadillo, eastern cottontail, swamp rabbit, beaver, muskrat, mink, coyote, red fox, gray fox, raccoon, striped skunk, and bobcat.

White-tailed deer appear to be abundant based on general observations. Limited deer population surveys have been conducted to date; however, general observations and available habitat all point to a healthy and abundant deer herd. Although no formal surveys have been conducted, it appears from general observations that feral hog populations are increasing on the refuge. Most of the damage to habitat has been documented in the White Springs Dewatering Unit, located in Limestone County.

Several mammals associated with the more permanently inundated wetlands and swamps, such as beaver, muskrat, swamp rabbits, and mink, appear to have healthy populations. Cottontail rabbit, raccoon, opossum, coyote, bobcat, fox, and gray squirrels also appear to be abundant on Wheeler NWR.

Beavers have a tremendous potential negative impact on bottomland hardwoods and forested wetlands. They interfere with wildlife management activities by plugging culverts, ditches, and WCSs. This action also backs water up onto private adjoining lands. Problems associated with the impounding of water by beaver are proving to be the single greatest threat to timber resources within the refuge. Little or no formal data are available to provide population estimates for these species. However, general observations and data collected from control efforts indicate that the number of beavers have increased in recent years.

Amphibians and Reptiles

Various species of water snakes are common or abundant on Wheeler NWR, especially the yellow-bellied and midland water snakes. Venomous snakes include the copperhead, cottonmouth, and timber and canebrake rattlesnakes. Rat snakes of mixed or uncertain subspecies are likely the most abundant snake. Black racers, black kingsnakes, corn snakes, eastern ribbon snakes, and eastern garter snakes are also common.

The more commonly seen turtle species are the yellow-bellied pond slider or mix of yellow-bellied and red-eared pond slider, common snapping turtle, eastern box turtle, southern painted turtle, eastern spiny softshell, and the river cooter. The ground skink and the five-lined skink are two of the most common lizard species.

Many different species of frogs and toads are found on Wheeler NWR. Recent call counts and field observations indicate that the more common species include northern leopard frogs, northern spring peepers, gray treefrogs, green treefrogs, upland chorus frogs, Fowlers toad, and eastern narrow-mouthed toads.

Spotted and marbled salamanders are also common. Cave salamanders occur in the cave entrances with slimy salamanders using these and rocky ledges. Little or no formal data are available to provide population estimates for these species. However, general observations indicate that the number of amphibians and reptiles have declined in recent years on Wheeler NWR.

Fisheries

Wheeler Reservoir is home to many species of fish. Since all water fluctuates with the reservoir (six feet annually and ten feet during flooding events), opportunities for fish management are limited. Impoundments and streams on Wheeler NWR do contain fish and are naturally restocked during flooding events. Seasonal flooding of wooded areas provides a vast quantity of spawning and feeding habitat. Some of these species include largemouth bass, spotted bass, black crappie, white crappie, bluegill, redear sunfish, white bass, yellow bass, channel catfish, blue catfish, flathead catfish, alligator gar, largemouth and smallmouth buffalo, freshwater drum, and shad.

Threatened, Endangered and Special Concern Species

The following federally listed endangered species have been documented on or in close proximity to Wheeler NWR: gray bat, Anthony's riversnail (*Athearnia anthonyi*), armored snail (*Pyrgulopsis pachyta*), fine-rayed pigtoe (*Fusconaia cuneolus*) (Historical - 1925), slabside pearlymussel (*Lexingtonia dolabelloides*) (Historical - 1925), pink mucket (*Lampsilis abrupta*), ring pink (*Obovaria retusa*) (Historical - 1904), rough pigtoe (*Pleurobema plenum*), slender campeloma (*Campeloma decampi*), and bald eagle (*Haliaeetus leucocephalus*).

The American alligator (*Alligator mississippiensis*), which is listed as Threatened Due to Similarity of Appearance to the American Crocodile, is also found on the refuge. Other special concern species known or suspected to exist on Wheeler NWR include: American white pelican, eastern hellbender (*Cryptobranchus alleganiensis*), green salamander (*Aneides aeneus*), Cave Springs cave spider (*Nesticus barri*), Tennessee cave salamander (*Gyrinophilus palleucus*), and alligator snapping turtle (*Macrolemys temmincki*).

Gray Bat

The gray bat is a small bat which uses caves that are normally located within one mile of a river or reservoir. They use warm caves in the summer where they establish maternal breeding and bachelor colonies. In the winter they relocate and hibernate in a few small cold caves (Johnson et al., 1995). Gray bat emergence counts are conducted annually at Cave Springs Cave on Wheeler NWR and have averaged 12,500 bats since 1997.

Gray bats are very sensitive to disturbance so entering Cave Springs Cave is not permitted. Since Cave Springs Cave is a gray bat maternity colony, biologists enter the cave after the adult bat emergence has ended to locate the newly born bats. Biologists then estimate the number of young bats clinging to the cave walls and ceiling.

Freshwater Mussels

Thirty-eight species of freshwater mussels may be found in waters within or in close proximity to the boundaries of Wheeler NWR. Two of these species are endangered: the rough pigtoe and the pink mucket (pearly mussel).

Freshwater Snails

Twenty-six species of freshwater snails may be found in waters within or in close proximity to the boundaries of Wheeler NWR. Two of these species are endangered: Anthony's riversnail and the armored snail. Historical records indicate that these species have been documented in the Piney and Limestone Creeks that flow into Limestone Bay.

American Alligators

Evidence of reproduction by American alligators has been seen in five of the last seven years. This population may have resulted from the intentional release of this species in the late 1970s in order to help control beavers; though there are historical data in refuge files dating back to 1964 and at least one published newspaper account of a small alligator along the Tennessee River near Florence in 1895. Mount (1975) indicates that the historical range was far south of the refuge.

Bald Eagles

Bald eagles have been observed for short periods wintering on or migrating through the area. In the summer of 2006, two bald eagle nests in close proximity to one another and likely built by the same pair, were found on Wheeler NWR. These nests are the first documented bald eagle nests found on Wheeler NWR since 1947.

American White Pelicans

White pelicans are seen on Wheeler NWR from fall through spring. In the 2005 -2006 waterfowl survey, the highest number documented was 134 (November 1). This number is much lower than the high numbers observed in 2004 (531).

Key Cave NWR

Key Cave NWR is the only known location of the Alabama cavefish, a small, blind colorless fish which inhabits the underground pools in Key Cave. Only nine specimens are known to exist in scientific collections, and few individuals have been observed in the wild. Considering the limited distribution and the few species seen or collected, this species appears to be one of the rarest of all North American freshwater fish (Boschung and Mayden 2004). The cave is also a priority one maternity cave for the endangered gray bat. Gray bat emergence counts are conducted annually at Key Cave and have averaged 33,400 gray bats since 1997. Approximately 12,000-13,000 young gray bats are produced annually by this maternity colony. In addition to the gray bat, two species of blind crayfish also inhabit Key Cave.

Key Cave NWR provides habitat for a variety of migratory and resident wildlife species. One hundred and sixty-six bird species have been sighted on the refuge. Several grassland-dependent bird species are commonly seen during the breeding season, including dickcissel, grasshopper sparrow, field sparrow, and northern bobwhite.

In addition, northern harriers can be seen flying low over refuge grasslands searching for prey during the winter months and short-eared owls can also be seen occasionally during the winter. Other commonly seen wildlife species include cottontail rabbits, coyotes, white-tailed deer, gray squirrels, eastern meadowlarks, mourning doves, horned larks, and eastern bluebirds.

Recently, feral hogs have been documented on Key Cave NWR. These invasive animals have been destroying habitat and damaging crops. Observations indicate that the population of feral hogs is increasing at Key Cave NWR. Current efforts to control the feral hogs by complex staff and volunteers have been unsuccessful. Many other wildlife species can be found on Key Cave NWR, including a wide variety of invertebrates, amphibians, reptiles, and mammals.

Sauta Cave NWR

As is the case with many large caves, rare and unique species occur in Sauta Cave. As a result, the Alabama Natural Heritage Program ranks the cave's biodiversity as a site of very high significance. Sauta Cave provides crucial habitat for the federally listed endangered gray and Indiana bats. The cave provides a summer roosting site for about 300,000 – 400,000 gray bats and a winter hibernaculum for both bats.

Indiana bats hibernate in caves and mines during the winter. They disperse from their hibernation caves in the spring and form separate male, female, and juvenile colonies. Females from maternal colonies roost under the loose bark of trees, usually near water. Little is known about where males spend the summer (Johnson et al., 1995). In addition, the rare Tennessee cave salamander has been found inside Sauta Cave.

Outside the cave, Sauta Cave NWR is home to a wide variety of invertebrates, amphibians, reptiles, birds, and mammals. A federally threatened plant, Price's potato-bean, occurs in isolated places on the Sauta Cave NWR. Price's potato-bean is a climbing yellow-green vine that grows from a stout, potato-like tuber. The vines may be up to 15 feet long with pale pink or greenish yellow peas or bean type flowers, which bloom from July until August. The fruit consists of a pod about four to six inches long. The plant grows in forest openings in mixed hardwood stands where ravine slopes grade into creek or stream bottoms (Johnson et al., 1995).

Fern Cave NWR

Fern Cave contains the largest wintering colony of gray bats in the United States with over one million bats hibernating there in the winter. Bat experts also think that Indiana bats may be using the cave. However, in the most recent survey of 2003, no Indiana bats were observed. In addition, a unique array of cave fauna has been documented.

One survey expedition noted the following species: cave fish (*Typhlichthys subterraneus*), cave crayfish (*Procambarus horsti*)(one female with eggs), surface crayfish (*Cambarus zophonastes*), banded sculpins (*Cottus carolinae*), bluegill (*Lepomis macrochirus*), yellow bullhead catfish (*Ictalurus natalis*), cave salamanders (*Eurycea lucifuga*), northern slimy salamanders (*Plethodon glutinosus*), honey-colored crickets (Orthoptera: Euhadonecus), mosquitoes (Diptera: Culicidae), crane flies (Diptera: Tipulidae), heliomyzid flies (Diptera: Heliomyzidae), frogs (Anura:), Eastern pipistrelles (*Pipistrellus subflavus*), and white millipedes (Diplopoda: Oxilus).

Outside the cave, Fern Cave NWR is home to a wide variety of invertebrates, amphibians, reptiles, birds, and mammals. The federally threatened American's Harts-tongue fern, a leafy fern which grows in high humidity, deeply shaded conditions near limestone sinks and caves, has been documented on the refuge (Johnson et al., 1995).

CULTURAL RESOURCES

Cultural resources include historic properties as defined in the National Historic Preservation Act; cultural items as defined in the Native American Graves Protection and Repatriation Act; archaeological resources as defined in the Archaeological Resources Protection Act; sacred sites as defined in Executive Order 13007, Protection and Accommodation of Access To "Indian Sacred Sites," to which access is provided under the American Indian Religious Freedom Act; and collections. As defined by the National Historic Preservation Act, a historic property or historic resource is any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. These include any artifacts, records, and remains that are related to and located in such properties.

The term also includes properties of traditional religious and cultural importance (traditional cultural properties), which are eligible for inclusion in the National Register of Historic Places as a result of their association with the cultural practices or beliefs of an American Indian tribe. Archaeological resources include any material of human life or activities that is at least 100 years old, and that is of archaeological interest.

Wheeler Complex follows these legal mandates to protect the public's interest in preserving the cultural legacy that may potentially occur on the Complex. Whenever construction work is undertaken that involves any excavation with heavy earth-moving equipment, such as tractors, graders, and bulldozers used in the development of moist-soil units, a Service Archaeologist conducts an archaeological survey of the site. The results of this survey are submitted to the Service's Regional Historic Preservation Officer, as well as to the State Historic Preservation Officer (SHPO), which, in Alabama, is a member of the Alabama Historical Commission.

The State Historic Preservation Officer reviews the surveys and determines whether cultural resources will be impacted, that is, whether any properties listed in, or eligible for listing in the National Register of Historic Places will be affected. If cultural resources are actually encountered during construction activities, the refuge is to notify the SHPO immediately. To date, no properties on the Wheeler Complex have been determined to be eligible for listing in the National Register of Historic Places.

This northern region of Alabama has long been settled and used by humans, in good part because of its mild winters and abundant fish and wildlife resources. Prior to European settlement in the early 1800s, the Tennessee Valley was controlled by Native Americans of the Shawnee, Chickasaw, or Cherokee Tribes (Joiner 1987). Some European families moved into the area prior to the time when the Chickasaws and Cherokees gave up their claims to the area in 1806, but there were not enough settlers in the valley to form a county until 1808. Early settlers found an almost unbroken forest blanket over the valley and it provided the needed building materials to support the development of Madison County, the most populated area in the territory that would later become Alabama.

Cultural resource inventories within the Wheeler Complex have been conducted on approximately 15,000 acres at Wheeler NWR (Futato 1979 and Shaw 2000), approximately 10 acres at Sauta Cave NWR, and approximately five acres at Fern Cave NWR. As of this date, no known cultural resource inventories have been conducted at Key Cave NWR. The cultural resource inventories to date revealed four archaeological sites that were deemed of important cultural value on Wheeler NWR (Shaw 2000).

SOCIOECONOMIC ENVIRONMENT

Refuges managed by the Wheeler Complex are located in Jackson, Lauderdale, Limestone, Madison, and Morgan Counties. This geographic area is locally known as the Tennessee Valley and is one of the South's fastest-growing regions. Regional unemployment is low and income levels are relatively high when compared with other locations in the State of Alabama (U.S. Census Bureau 2005). Recent studies have noted that the area's cost of living is one of the lowest in the United States and the economy is stable (City of Huntsville 2006). All of these factors make the Tennessee Valley a desirable place to live. Of the five counties in which refuges are located, only Lauderdale and Jackson Counties have experienced a decline in population (-0.5 percent, and -0.2 percent, respectively). In contrast, Limestone and Madison Counties have almost doubled the national rate of population growth (Table 5) (U.S. Census Bureau 2005)

The Tennessee Valley region's economy is financially strong due primarily to the success of the federal defense and aerospace sector, local businesses, and industries along the river. More recently, the economy has become heavily dependent upon the continued presence of the U.S. Army's Redstone Arsenal.

Redstone Arsenal is one of the U.S. Army's most important strategic posts. It is responsible for research; development; production; and worldwide support of missiles, aviation, rockets, and related programs. The influx of engineers, scientists, and other technical specialists has transformed the Tennessee Valley into a region where companies specializing in technology advancements can thrive. More than half of the jobs in Madison County and a large number of jobs for residents of Jackson, Lauderdale, Limestone, and Morgan Counties are dependent upon federal defense and aerospace activities at the installation (City of Huntsville 2006).

OUTDOOR RECREATION ECONOMICS

The fish and wildlife of Alabama are economically important (Table 6). In 2001, over 4.2 million people enjoyed fishing, hunting, or wildlife observation activities in Alabama. Residents and non-residents combined spent more than three billion dollars total on fishing, hunting, and wildlife observation in the State of Alabama (U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of the Census 2003). Sport fishing, hunting, wildlife viewing, and wildlife photography are economically important to local businesses.

Unfortunately, a general lack of regard for the conservation of fish and wildlife resources combined with wetland clearing and draining has led to the loss of valuable fishery spawning grounds and the loss of habitat for many wildlife species. In the attempt to restore and protect some of these resources, Wheeler Complex serves an important role, not only by providing habitat for a diversity of plant and wildlife species, but also by serving as a place where people can go to enjoy these resources.

Refuges within the Wheeler Complex play an important role in the economy of the communities in which they reside, not only with the activities they provide, but through employment opportunities and visitors spending money on goods and services. Hunting and fishing and more recently, ecotourism (wildlife observation, wildlife photography, and environmental education and interpretation) are increasingly seen as desirable industries. As land development continues and the number of places left to enjoy wildlife decreases, refuge lands may become even more important to the local community. They can benefit the local economy directly by providing recreational and employment opportunities for the local population and indirectly by attracting tourists from outside the area to generate additional dollars.

Table 5. Comparison of geographic and demographic statistics for Lauderdale, Limestone, Jackson, Madison, and Morgan Counties, Alabama, and the USA

| Area | Land Area (sq. miles) | Population (2004 estimate) | Pop. Density (residents per sq. mile) | % pop. change (2000-2003) | Per capita income | % below poverty | % White | % Black | % Hispanic | % Asian | % Native American |
|-------------------|-----------------------|----------------------------|---------------------------------------|---------------------------|-------------------|-----------------|---------|---------|------------|---------|-------------------|
| Lauderdale County | 669 | 87,515 | 131 | -0.5 | \$18,626 | 14.4 | 88.4 | 9.8 | 1.0 | 0.4 | 0.3 |
| Limestone County | 568 | 69,387 | 116 | 5.7 | \$17,782 | 12.3 | 83.8 | 13.3 | 2.6 | 0.4 | 0.5 |
| Jackson County | 1,079 | 53,821 | 50 | -0.2 | \$16,000 | 13.7 | 91.9 | 3.7 | 1.1 | 0.2 | 1.8 |
| Madison County | 805 | 293,072 | 344 | 5.8 | \$23,091 | 10.5 | 72.1 | 22.8 | 1.9 | 1.9 | 0.8 |
| Morgan County | 582 | 113,211 | 191 | 1.9 | \$19,223 | 12.3 | 85.1 | 11.2 | 3.3 | 0.4 | 0.7 |
| Alabama | 50,744 | 4,530,182 | 88 | 1.9 | \$18,189 | 16.1 | 71.1 | 26.0 | 1.7 | 0.7 | 0.5 |
| USA | 3,537,438 | 290,809,777 | 80 | 3.3 | \$21,587 | 12.4 | 75.1 | 12.3 | 12.5 | 3.6 | 0.9 |

Sources: (U.S. Census Bureau 2005)

Table 6. Wildlife-dependent recreation by participants, 16 years old and older, across Alabama

| Activity | # of Participants | Activity Days | Average Days / participant | Total Expenditures (\$1,000) | Trip-related Expenditures (\$1,000) | Equipment and Other (1, 000) | Average Expenditure / participant (\$) | Average Trip Expenditure / day (\$) |
|----------------------|------------------------|---------------|----------------------------|------------------------------|-------------------------------------|------------------------------|--|-------------------------------------|
| Fishing | 1,485,000 ^a | 22,116,000 | 17 resident 13 nonres. | 1,323,831 | 629,328 | 629,503 | 946 resident 870 nonres. | 31 resident 32 nonres. |
| Hunting | 739,000 ^b | 14,878,000 | 23 resident 18 nonres. | 1,316,421 | 382,348 | 934,073 | 2,069 res. 1,550 non. | 26 |
| Wildlife Observation | 1,981,000 ^c | N/A | N/A | 1,288,974 | 189,457 | 1,099,517 | 687 resident 616 nonres. | N/A |

Source: 2001 National Survey of Fishing, Hunting, and Wildlife-associated Recreation: Alabama

^a634,000 residents, 851,000 nonresidents

^b316,000 residents, 423,000 nonresidents

^c965,000 residents, 1,016,000 nonresidents

Table 7. North Alabama Birding Trail sites on Wheeler Complex

| Site Number | Site Name |
|-------------|--|
| 9 | Key Cave NWR |
| 16 | Wheeler NWR – Visitor Center |
| 20 | Wheeler NWR – White Springs Dike |
| 23 | Wheeler NWR – Arrowhead Landing |
| 24 | Wheeler NWR – Beaverdam Peninsula Tower |
| 25 | Wheeler NWR – Beaverdam Swamp Boardwalk |
| 26 | Wheeler NWR – Blackwell Swamp |
| 31 | Wheeler NWR – Cave Springs |
| 33 | Wheeler NWR – Dancy Bottoms Nature Trail |
| 39 | North Sauty Creek WMA/ Sauta Cave NWR |

TOURISM

Tourism is a big business in Alabama, contributing \$7.3 billion in revenues in 2004 and 8.3 percent of all non-agricultural jobs (Alabama Bureau of Tourism and Travel 2005). It is estimated that over 20.6 million people visited Alabama during 2004. The Alabama Bureau of Tourism and Travel and many other public and private agencies promote the state's attractions. Among these are a number of tours and trails that either pass close or reside on the refuges in the Wheeler Complex. Some of these events include: Native American Trail of Tears, Tennessee Valley Civil War Trail, Fall Color Trail, Tennessee Valley Talon Trail, North Alabama Birding Trail, and Saturday Walking Tours (Alabama Bureau of Tourism and Travel 2004).

Bird watching is a big hobby for many Alabama residents. An estimated 700,000 people participate in bird watching and other wildlife observation in Alabama each year. Alabama wildlife officials have attempted to attract more birdwatchers by creating the North Alabama Birding Trail. The trail, completed in 2005, contains 50 bird-watching sites in twelve northern Alabama counties (ADCNR 2004). The Wheeler Complex plays an important role in the success of the trail. Three of the refuges (Wheeler, Key Cave, and Sauta Cave NWRs) in the Wheeler Complex are home to ten North Alabama Birding Trail sites (Table 7).

REFUGE ADMINISTRATION AND MANAGEMENT

LAND PROTECTION AND CONSERVATION

Wheeler NWR

There are no immediate plans to expand the current boundary of Wheeler NWR. Since the refuge was established in 1938 as an overlay on TVA lands, an approved acquisition boundary does not exist. Law enforcement (LE) patrols are conducted to provide visitor safety and protection for cultural and biological resources. Three Partners for Fish and Wildlife projects have been completed in counties near the refuge and one is currently in progress. Opportunities for other private land projects in the vicinity of Wheeler NWR are monitored annually.

Key Cave NWR

All lands within the 1,060-acre established acquisition boundary for Key Cave NWR have been acquired. No in-holdings exist and there are no immediate plans to expand the acquisition boundary. Law enforcement (LE) patrols are conducted to ensure that people are abiding by refuge regulations, particularly rules prohibiting entrance into the Cave itself. Currently, three Partners for Fish and Wildlife projects are in progress in Lauderdale County (the county in which Key Cave NWR resides) and opportunities for others are monitored annually.

Sauta Cave Refuge

All lands within the 264-acre established acquisition boundary for Sauta Cave NWR have been acquired. No in-holdings exist and there are no immediate plans to expand the acquisition boundary. Steel gates are erected and maintained at the two cave entrances and LE patrols are conducted periodically to ensure that people are abiding by refuge regulations, particularly rules prohibiting entrance into the Cave itself. Three Partners for Fish and Wildlife projects have been completed in Jackson County (the county in which Sauta Cave NWR resides) and opportunities for others are monitored annually.

Fern Cave NWR

Land acquisition continues to be a priority as there are still 483 acres within the 682-acre established acquisition boundary for Fern Cave NWR. One tract of adjoining private land just off the southern refuge boundary contains the Surprise Pit entrance to the Fern Cave system. The Service cannot fully control access into Fern Cave and protect the endangered bats from disturbance as long as there is still access to the Cave from off-refuge lands. Lands will continue to be purchased when and if there are any willing sellers and funds are available. Law enforcement patrols are conducted to ensure that people are abiding by refuge regulations, particularly rules prohibiting entrance into the cave itself. Three Partners for Fish and Wildlife projects have been completed in Jackson County (the county in which Fern Cave NWR resides) and opportunities for others are monitored annually.

VISITOR SERVICES

The National Wildlife Refuge System Improvement Act of 1997 outlines six priority public uses as appropriate for national wildlife refuges as long as they are compatible with the purpose(s) for which the refuge was established. The six priority uses are fishing, hunting, wildlife observation, wildlife photography, and environmental education and interpretation. The following section describes the public use opportunities available at each refuge in the Wheeler Complex.

Wheeler NWR

Wheeler NWR recognizes and provides the six priority wildlife-dependent uses of fishing, hunting, wildlife observation, wildlife photography, and environmental education and interpretation. Most activities are usually conducted at the 10,000-square foot Visitor Center (the Givens Interpretation Center) and/or the Wildlife Observation Building. In 2006, an estimated 650,651 persons visited the refuge. Of those, 34,000 toured the Givens Interpretation Center and an estimated 44,000 used the Wildlife Observation Building. A large portion of the visits were for fishing (274,265), wildlife observation and photography (124,477), boating (88,000), and hunting (62,240). The remaining visits were for environmental education (13,974) and interpretation (9,695). The locations of current public use facilities at Wheeler NWR are illustrated on Figure 11.

Hunting is permitted on approximately 18,000 acres (Figure 12) and hunting regulations are published each year in the Wheeler NWR's hunting permit. White-tailed deer, feral hog, squirrel, rabbit, raccoon, opossum, and northern bobwhite are hunted within the state hunting season framework. Waterfowl hunting is not allowed on the refuge. During established refuge hunting seasons, areas are open daily, excluding Sundays when all hunting is prohibited. Hunting is also allowed to qualified personnel on 4,085 acres of refuge land within the boundary of Redstone Arsenal Military Installation and is administered by personnel from the Redstone Recreation Center. Law enforcement personnel on Redstone provide oversight and enforcement of hunting regulations.

Some areas have restrictions on species legal for harvest, methods of entry, and dates of entry. Areas that are not open to hunting are marked with appropriate signs. The hunting regulations' brochure features a relatively detailed map with special regulation areas marked with cross hatching. There are few directional signs that assist hunters in navigating to appropriate hunting areas. Refuge boundaries are clearly marked and are re-established on a four-year rotation.

State of Alabama and refuge regulations' brochures are readily available to hunters and are clear, concise, and accurate. Refuge maps are available and easily understandable. Accessible alternatives to written brochures are not available, but staff and volunteers are available to answer questions and provide information during Visitor Center hours (see page 13 for hours of operation).

Many of the roads on Wheeler NWR are closed seasonally to vehicular traffic to help avoid and minimize waterfowl disturbance. This action limits some hunting opportunities, however, the roads remain open to foot and bicycle traffic, allowing access to the refuge for all public uses, including hunting.

The Garth Slough area of the refuge is currently closed to all entry from November 15 – January 15 and the area immediately associated with the Visitor Center and Wildlife Observation Building is closed to all entry year-round with the exception of the Wildlife Observation Building Trail and the Atkeson Nature Trail. A ±500-acre area between HGH Road and the Tennessee River (Limestone and Madison Counties) is designated as a special access area. This is the only area of the refuge where all-terrain vehicles (ATVs) are allowed and only for permitted disabled hunters. Provisions for issuing special access permits are on file at the Visitor Center and headquarters administrative office.

Small and large game hunting provides high quality recreation for many people and is provided on Wheeler NWR. Dogs are allowed for small game hunting on the refuge. The use of dogs for raccoon hunting is a necessary and appropriate method for taking raccoons and is the only effective method of reducing raccoon populations. The use of dogs for rabbit and squirrel hunting is not only a traditional method of take, but also very effective. Field trials are allowed under special use permit. White-tailed deer hunting is essential for maintaining a healthy deer herd and limiting impacts on habitat. Currently, Wheeler NWR allows archery hunting and two weeks of primitive flintlock hunting for deer. Because the refuge property boundary is located extremely close to urban and residential areas, open water, and active farms, the use of modern firearms is prohibited.

The primary focus of deer management is to maintain a healthy population and not to produce trophy animals. According to the hunting permit, deer hunters are required to report harvests by calling either the headquarters administrative office or the Visitor Center to report sex, weight, and method of take. Refuge staff estimates a 50 percent compliance rate for this requirement. Data collected from this method suggest that the herd currently exhibits a fairly balanced sex ratio, while necropsy analysis indicates that the herd is healthy and approaching carrying capacity on Wheeler NWR.

In 2005-2006, an estimated total of 80 deer (45 bucks and 35 does) were harvested during the bow and flintlock seasons (Table 8). The heaviest deer (estimated weights) was 180 pounds (live weight), down from 200 pounds (live weight) in 2004. Wheeler NWR also held its second crossbow season in 2005-2006. Only two does were harvested. This number was down from the six bucks and six does harvested in 2004. The largest was a 118-pound (field dressed) doe harvested in Limestone County. The largest in 2004-2005 was a 168-pound (live weight) buck from Morgan County.

Feral hogs are destroying habitat on Wheeler NWR. Although populations are low, they appear to be increasing at an alarming rate. Recent habitat damage in the White Springs area indicated that even a small population of feral hogs can be extremely destructive. The refuge allowed a feral hog hunting season for the first time during the 2005-2006 hunting season.

Currently, feral hogs are allowed to be taken during the white-tailed deer season by using the same weapon that is legal at that time for deer. For example, a feral hog can be taken with a primitive flintlock as long as it is within the legal two-week flintlock season. Otherwise, a feral hog can only be taken during the archery season for white-tailed deer with either a bow or crossbow. In 2005-2006, four hogs were harvested on Wheeler NWR: three with a bow and one with a flintlock. This included two boars and two sows. All hogs were harvested in Limestone County.

Figure 11. Locations of public use facilities on Wheeler National Wildlife Refuge

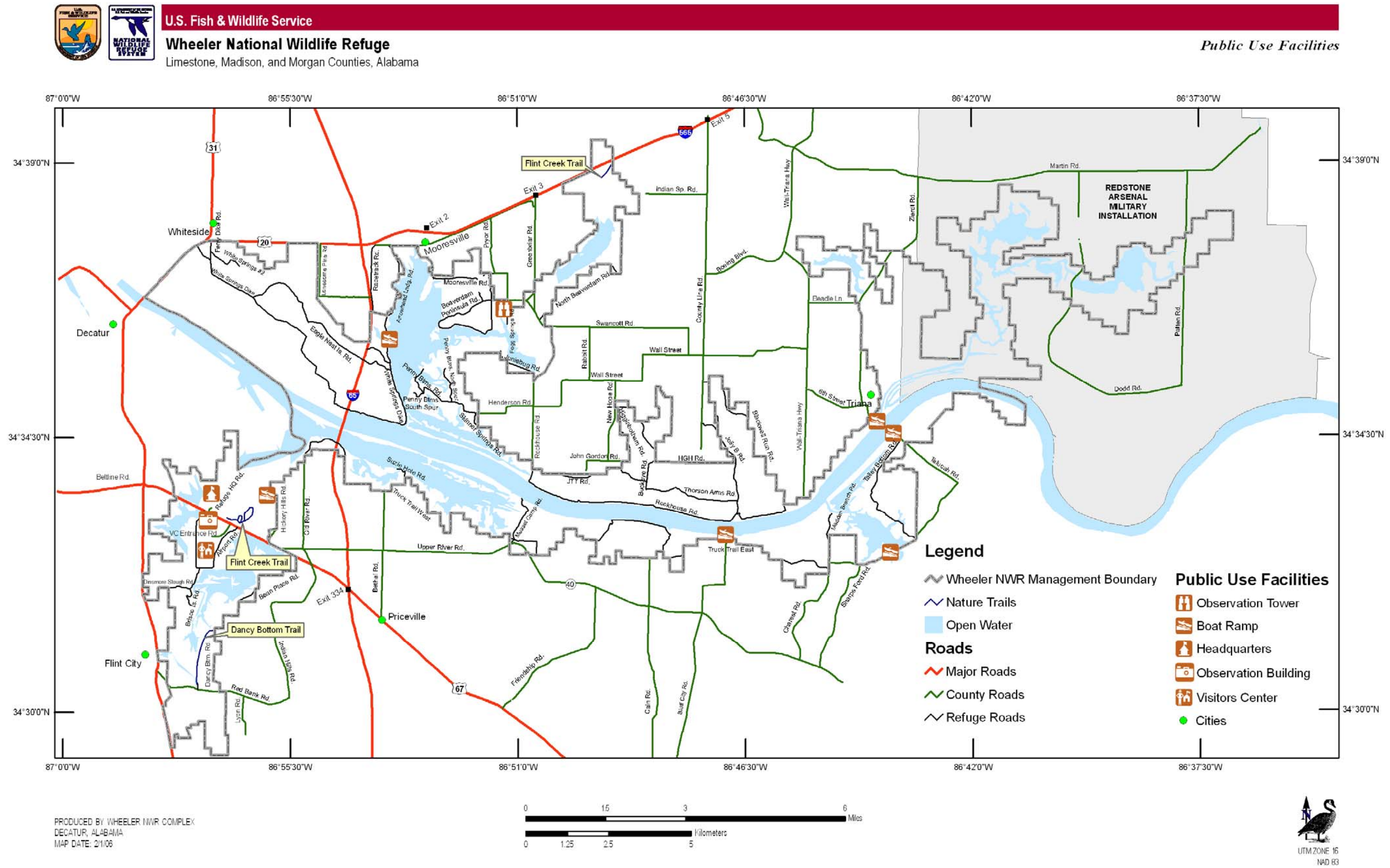


Figure 12. Locations of hunting areas on Wheeler National Wildlife Refuge

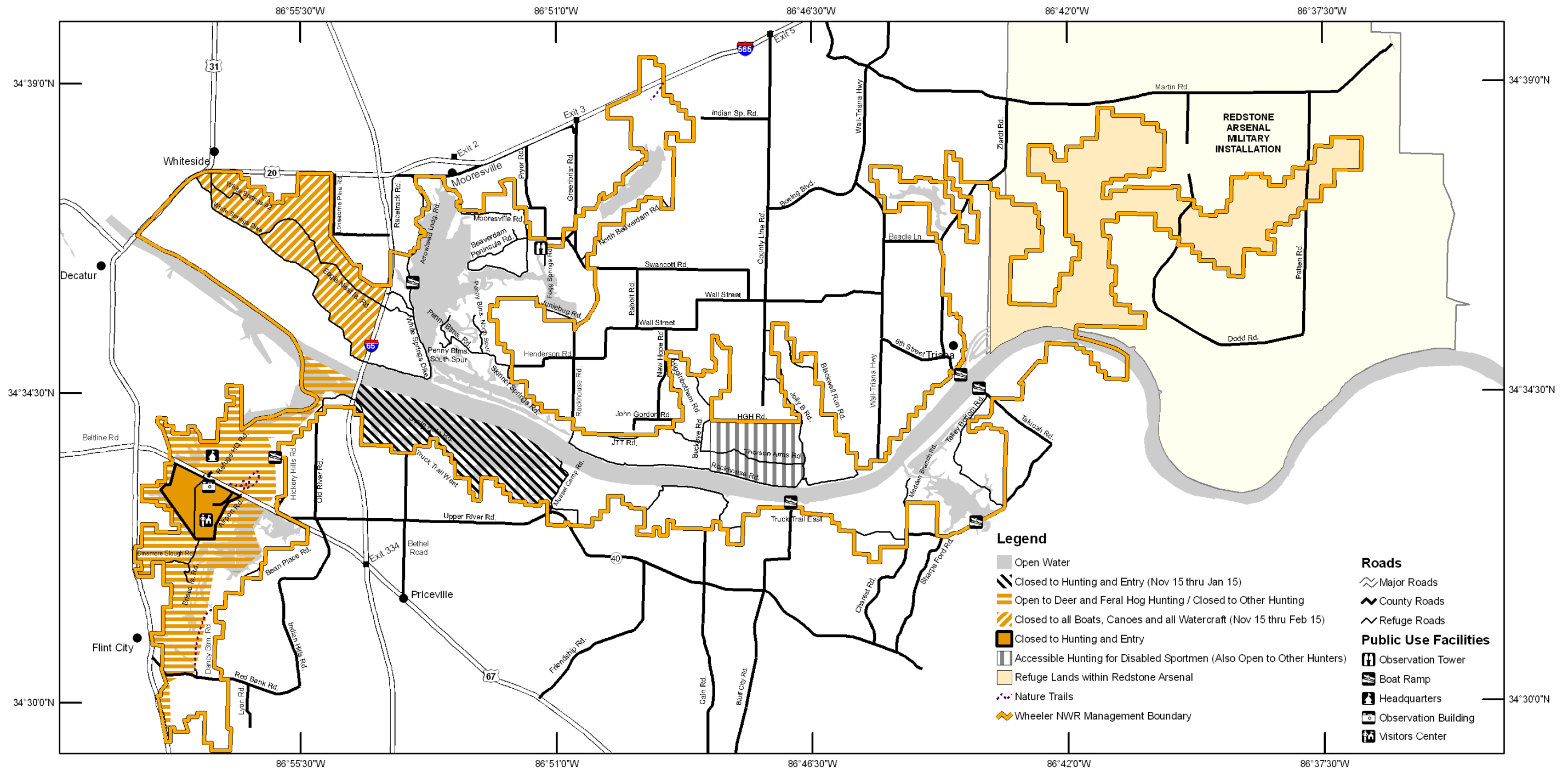


U.S. Fish & Wildlife Service

Wheeler National Wildlife Refuge

Limestone, Madison, and Morgan Counties, Alabama

Hunting Areas



PRODUCED BY WHEELER NWR COMPLEX
 DECATUR, ALABAMA
 MAP DATE: 2/1/06



Table 8. Deer harvest summary (2005-2006) at Wheeler NWR

| County | # of Bucks | Largest Buck - Estimated Weight (lbs) | # of Does | Largest Doe - Estimated Weight (lbs) | Total Number of Deer Harvested |
|--------------|------------|---------------------------------------|-----------|--------------------------------------|--------------------------------|
| Morgan | 15 | 180 LW ^a | 12 | 110 FD | 27 |
| Limestone | 17 | 180 LW | 12 | 150 LW | 29 |
| Madison | 13 | 170 LW | 11 | 140 LW | 24 |
| Total | 45 | - | 35 | - | 80 |

^aLW= live weight and FD= field dressed.

Fishing

Fishing is a very popular activity at Wheeler NWR, with an estimated 274,000 anglers trying their luck in refuge waters annually. Sport fishing on the refuge including method of take, daily creel limits, possession limits, and size limits is conducted in accordance with State of Alabama regulations. Refuge regulations governing the fishing program are described in the Fishing Information brochure and are readily available at the Visitor Center during business hours (see page 13 for hours of operation). The map provided in the fishing brochure, as well as the tear-off map available at the Visitor Center, is clear and easy to read. Boat launching facilities and bank fishing areas are clearly marked as are county and refuge roads.

Approximately 14,000 acres of surface waters are available for fishing. However, special refuge regulations apply to posted areas. For example, Crabtree Slough (Morgan County) is closed to watercraft from November 15 – February 15, thereby slightly reducing waters available to persons fishing from boats. In addition, fishing is prohibited in the Waterfowl Display Pool, waters adjacent to the Visitor Center, and around the shoreline of the refuge headquarters and housing units. Personal watercraft (e.g., jet skis) is prohibited in all waters with the exception of the main river channel and in Flint Creek up to the 3-mile marker. Commercial fishing nets are prohibited from October 15 – February 15.

The refuge fishing program meets Americans with Disabilities Act (ADA) requirements by providing a universally accessible fishing pier on Flint Creek across Highway 67 from the Visitor Center. In addition, the refuge has six improved boat ramps (Bluff City, Hickory Hills, Arrowhead Landing, Cotaco Creek, Talucah Landing, and Triana Recreational Area) and several unimproved ramps suitable for small boats and canoes. Many creeks and sloughs adjoin the main channel of the Tennessee River throughout the refuge. This provides excellent fishing opportunities for bass, sunfish, crappie, sauger, and catfish.

Organized fishing events, held in the three-acre special events fishing pond, continue to be very popular with the local community. Each year over 40 groups, ranging from special needs children and adults to summer day campers and Cub Scouts, enjoy fishing for catfish. For well over a decade, Wheeler NWR has hosted a Youth Fishing Rodeo on the first Saturday in May. For many anglers in the North Alabama area, Wheeler's Youth Fishing Rodeo introduced them to the love of fishing. The event is free of charge for youngsters from 5 to 14 years of age.

Wildlife Observation

There are many opportunities for wildlife observation and photography on Wheeler NWR, which currently has four designated nature trails (Atkeson Trail, Beaverdam Swamp Boardwalk Trail, Dancy Bottom Trail, and Flint Creek Trail), one wildlife observation tower, and one wildlife observation building. Furthermore, a wildlife drive (auto tour) is currently being developed.

The most popular facility on the refuge for wildlife observation is the Wildlife Observation Building, which is located just a short walk from the Visitor Center. This facility receives an estimated 44,000 visitors annually. Built on a knoll overlooking a waterfowl impoundment, it offers visitors the opportunity to see waterfowl and other wildlife up close. Spotting scope stations are provided, but they are often occupied so visitors are encouraged to bring binoculars. In an effort to create more attractive conditions for waterfowl, the Display Pool at the Wildlife Observation Building is drained each summer. Following drawdown, wading birds and shorebirds use the area in large numbers for foraging on small fish and other organisms. Aquatic vegetation growing in the Display Pool by late summer is used by thousands of ducks for foraging throughout fall and winter months.

A Backyard Wildlife Habitat Area on the south side of the Wildlife Observation Building attracts chickadees, goldfinches, house and purple finches, tufted titmice, sparrows, and hummingbirds to feeders. A man-made pond/waterfall provides habitat for native frogs, fish, and plants. A Wildlife Observation Tower is located on the north side of the refuge (Limestone County) and offers visitors an elevated view of the Beaverdam Peninsula, an area of the refuge managed primarily for geese and sandhill cranes.

Birding is one of the most popular forms of observation on Wheeler NWR. Viewing wintering ducks, Canada geese, and snow geese; catching spring and fall warbler migrations; looking for shorebirds and wading birds; watching hawks; and seeking unusual visitors, such as American white pelicans and sandhill cranes, is common practice for local and traveling birders. Bird identification programs are usually offered during winter months. In addition, Wheeler NWR is home to eight sites on the North Alabama Birding Trail (Table 7).

Watching bats emerge at dusk from Cave Springs Cave (Morgan County) is another popular wildlife observation activity. It is not uncommon to see 50,000 gray bats from Cave Springs Cave. Other wildlife often seen on the refuge includes rabbits, chipmunks, snakes, turtles, skinks, beavers, red-tailed hawks, muskrats, and a variety of birds.

Wildlife Photography

Like all national wildlife refuges, Wheeler NWR has an almost endless variety of natural wonders that can be photographed. Sunrises and sunsets can be spectacular, especially when reflected on water bodies such as Limestone Bay or the Tennessee River. Currently, the refuge has one permanent photography blind located in a closed area overlooking the Display Pool. Temporary blinds are permitted (see regulations below) and many subjects are available without the use of a blind.

Non-commercial photography is permitted in areas of the refuge that are open to the public. Refuge signs will notify individuals of closed areas. No permanent blinds are allowed. Temporary blinds must be removed each day. Photographers must follow other general refuge regulations, such as not removing any plants and animals. A special use permit is required for any commercial photography conducted on Wheeler NWR. Application for this type of permit can be made at the refuge's headquarters. Detailed information regarding the proposed activity must be submitted so refuge personnel can determine if the activity can be approved and what type of restrictions, if any, are required.

Environmental Education and Interpretation

A top priority of the Wheeler NWR public use program is to provide environmental education and wildlife interpretation opportunities to local school-aged children. In 2005, an estimated 8,500 students received on-site programs and another 1,700 students were contacted off-site. In addition, more than 3,000 other people of all ages were contacted through off-site visits and special events. The following sections provide a summary of a few of the environmental education and wildlife interpretation opportunities that are conducted each year at Wheeler NWR.

One of the most popular environmental programs titled, EARTHSCOPE is conducted annually by the Huntsville City School System. This program brings more than 2,000 third grade students to the Visitor Center for a half day of environmental education and wildlife observation during fall and winter months.

In addition, every year Wheeler NWR hosts the Morgan County and Decatur City Forestry Awareness Week Now (FAWN) festivals in May and October. The annual events involve over 600 sixth grade students from Morgan County in May and over 700 sixth grade students from Decatur City schools in October. Other activities that promote environmental education and wildlife interpretation include: the Junior Refuge Manager Program, the annual Wet-n-Wild Festival, and the Wheeler NWR Summer Day Camp. During the Wheeler NWR Summer Day Camps, over 200 local children ages 8 to 10 and 11 to 13 enjoy a full day on the refuge that includes many indoor and outdoor hands-on activities involving wildlife and land conservation. Wheeler NWR also serves as the state's receiving site for the Federal Junior Duck Stamp Contest, through an established partnership with the Alabama Wildlife Federation (AWF) and the Alabama Division of Wildlife and Freshwater Fisheries (ADWFF).

As part of community outreach efforts, a special partnership with the Decatur City Police Department's Alternative Choices through Educational Systems (A.C.E.S.) Program has been established. This arrangement provides more than 300 inner city youths with opportunities to experience a half day of fishing and environmental education on the refuge. Other partnerships are enjoyed with the Boy and Girl Scouts of America and the Morgan County 4-H Wildlife Club.

The primary interpretive theme of Wheeler NWR focuses on the awareness and importance of waterfowl, migratory birds, and their conservation. Approximately 30,000 people come to the Visitor Center annually to view exhibits, hike on two nature trails, participate in educational programs, or watch videos on a variety of wildlife-related topics. Interpretive messages are conveyed to the public through an exhibit area in the Visitor Center. A large auditorium with a seating capacity of 120 is used for showing videos, films, or presentations. In addition, the Visitor Center contains a large classroom that is used for environmental education and interpretation.

Informative environmental presentations and tours are given both on-site and off-site by a public use staff of three and several volunteers. An information kiosk is located at the entrance drive to the Visitor Center that provides refuge information at all times. Refuge brochures and maps are all up to date. A tear sheet (11x14) available to visitors at the refuge administrative office and Visitor Center provides a detailed map and information about the refuge.

Visitor Center staff frequently answers questions regarding refuge lands and wildlife. Numerous field guides are available at the desk and general information is offered on most species of wildlife that may be encountered on the refuge. Wheeler NWR uses two portable exhibits for off-site interpretation. The first exhibit is specific to interpretive information about the Wheeler NWR and the second exhibit provides information and locations for the other refuges located in Alabama.

Other Uses

Firewood cutting is a popular activity, but occurs only in designated areas after obtaining a special downed wood permit from refuge administration. All-terrain vehicles are not allowed on the refuge, except for handicapped hunting in the designated area. A special use permit must first be obtained from the refuge headquarters. Horseback riding is restricted to open gravel and/or paved roads and horses are not permitted to enter closed areas. Camping is not allowed on the refuge.

Key Cave NWR

Currently, public use of Key Cave NWR is light, but increasing. Key Cave itself is managed for protection; therefore it is not open to the public due to the potential for disturbance of federally endangered species. Other portions of the 1,060-acre refuge are open daily, dawn to dusk, and there are no entrance fees. Vehicular access is not allowed, except for vehicles with valid handicapped permits. Vehicles may be parked at the interpretive kiosk parking lot or at other designated parking areas. Handicapped parking is available at both the interpretive kiosk and at the Wildlife Observation Tower. Locations of the public use facilities at Key Cave NWR are illustrated on Figure 13.

Hunting

Small game hunting is allowed on 1,060 acres of the refuge through a permitting program in conjunction with the state's Seven Mile Island Wildlife Management Area. Squirrel, rabbit, raccoon, opossum, mourning dove, and northern bobwhite are hunted within the state hunting season framework. The refuge hunting season runs concurrently with the state hunting season and hunting is allowed on Monday, Tuesday, Friday, and Saturday. Hunting opportunities are evaluated annually at Key Cave NWR to ensure that each hunting activity is compatible with the purposes, goals, and objectives of the refuge.

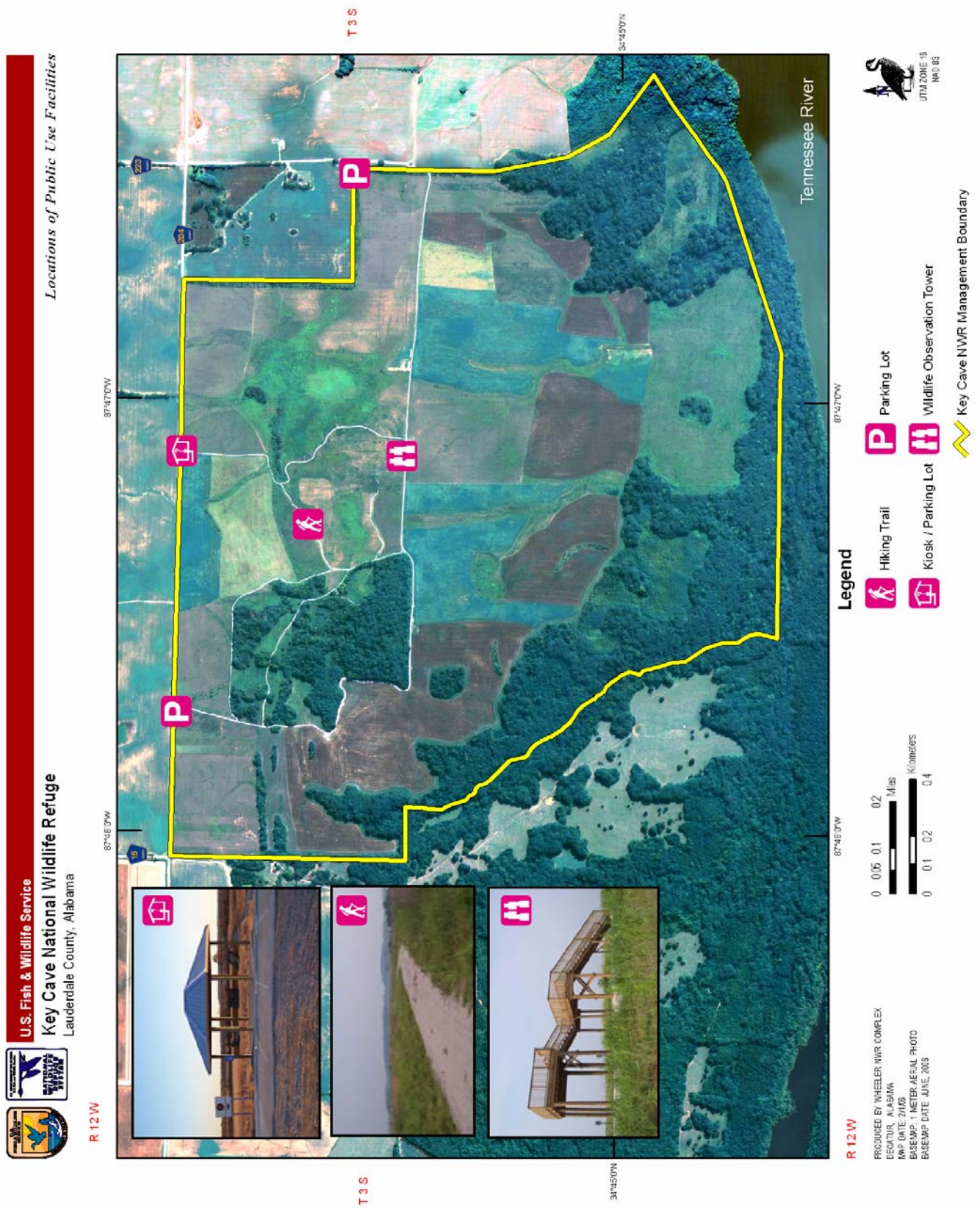
Wildlife Observation and Photography

Key Cave NWR has over 2.5 miles of roads and nature trails that are available for walking, hiking, and/or bicycling. These roads and nature trails pass through native warm season grasslands (NWSG), upland hardwoods, and agricultural cropland. The gravel-based nature trail system offers opportunities to view or photograph an assortment of wildlife, including many grassland bird species. A 14-foot, dual level Wildlife Observation Tower is located in the interior of the refuge (approximately 0.75 miles from the kiosk) and provides a great view.

Environmental Education and Interpretation

An interpretive kiosk is located along Dabney Lane (the northern boundary of the refuge) and is also stop # 9 along the North Alabama Birding Trail (Table 7). The kiosk provides visitors with information about native warm season grassland management at the refuge, as well as information on some of the priority bird species that are found in grassland habitats. The kiosk also contains interpretive panels that discuss the karst geology that underlies the refuge and briefly discusses the history of the federally endangered Alabama cavefish.

Figure 13. Locations of public use facilities on Key Cave National Wildlife Refuge



Sauta Cave NWR

Public use of Sauta Cave NWR is light, but increasing. Due to the potential for disturbance of federally endangered bats, Sauta Cave itself is gated and not open to the public. However, a special use permit to enter the cave may be issued by refuge administration for research purposes only. Other portions of the 264-acre refuge are open to the public. Vehicular access is not allowed. Persons wishing to visit the refuge may park their vehicles at the gated entrance just off of U.S. Highway 72. Outdoor facilities are open daily, dawn to dusk (year-round) and there are no entrance fees. Locations of public use facilities at Sauta Cave NWR are illustrated on Figure 14.

Hunting

Hunting is currently allowed on 264 acres at Sauta Cave NWR through a permitting program in conjunction with the state's North Sauty Wildlife Management Area. White-tailed deer (archery only), squirrel, rabbit, raccoon, and opossum are hunted within the state's season framework. Hunting opportunities are evaluated annually to ensure that the activity is compatible with the purpose, goals, and objectives of the refuge.

Wildlife Observation and Photography

During the months of June, July, and August, one of nature's most spectacular events occurs every evening at Sauta Cave NWR. At dusk, up to 400,000 bats leave the cave to begin their nightly foraging activities. This event can last for up to an hour. Large numbers of visitors may go to the cave on summer weekends to observe the streaming emergence of gray bats. A Wildlife Viewing Platform was constructed in 2005 to aid in the viewing experience.

Fern Cave NWR

Because of the isolated nature of the refuge, difficulty of access, and lack of directional signs, general public use on Fern Cave NWR is extremely low. Furthermore, due to the potential for disturbance of federally endangered bats and the highly technical nature of a 400-foot vertical descent into the cave system, Fern Cave itself is not open to the general public. Access into the cave is essentially limited to professional cavers with the expertise to make the vertical descent. In addition, access is only granted for research and monitoring purposes.

In 2006, for the 18th year, the Huntsville Grotto of the National Speleological Society coordinated access to the cave by special use permit. The Huntsville Grotto handled all special use permits to enter the cave and monitored the cave's condition. Hunting is not currently allowed on the refuge. Other portions of the 199-acre refuge are open to the public. The refuge is open daily, dawn to dusk (year-round) and there are no entrance fees.

PERSONNEL, OPERATIONS, AND MAINTENANCE

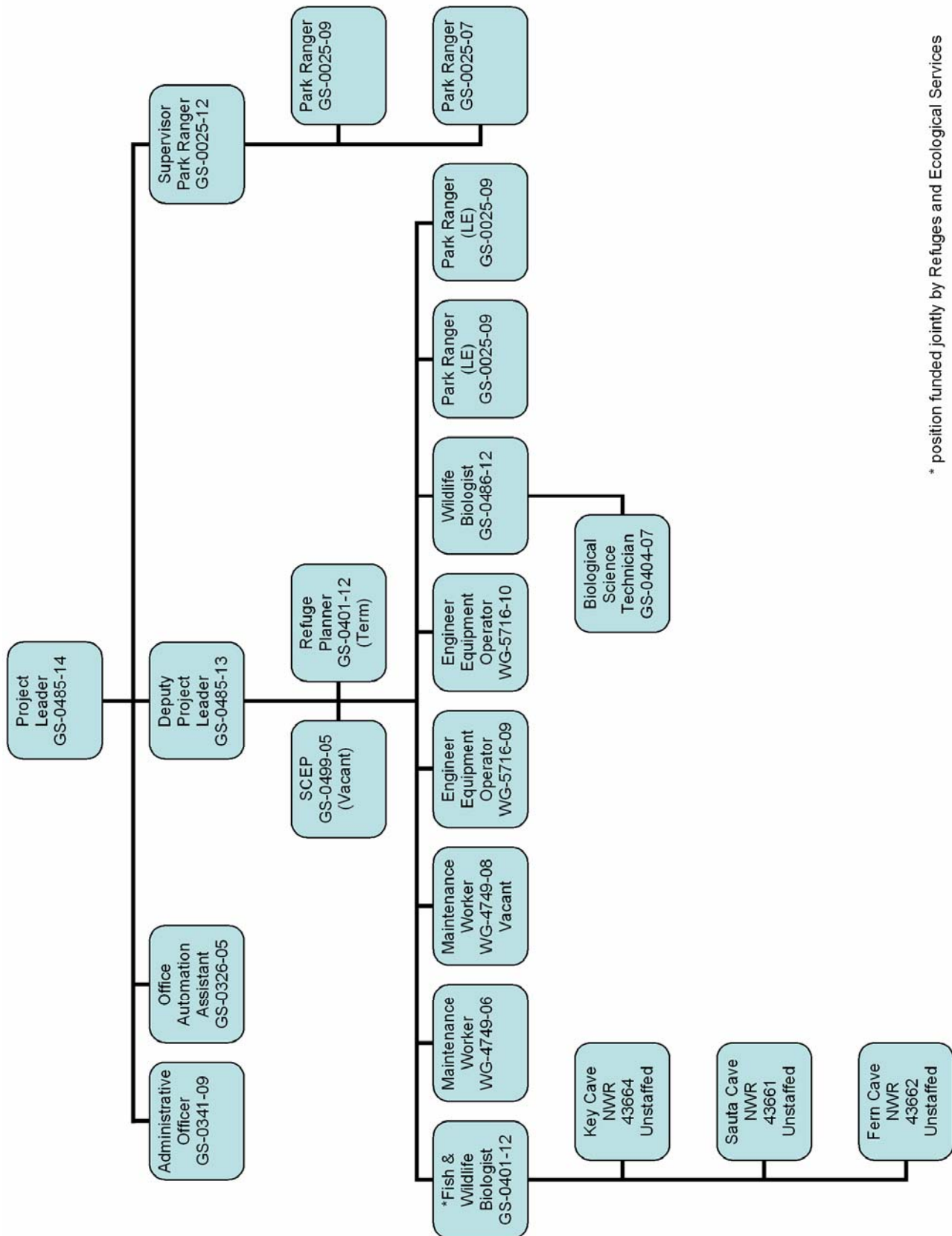
Staffing

The 39,900 -acre Wheeler Complex is currently staffed with 15 full-time employees (FTE) and one term staff member. Wheeler NWR alone has seventeen approved FTEs, and currently two positions are vacant (i.e., SCEP and Maintenance). One FTE is jointly funded between Refuges and Ecological Services. Key Cave, Sauta Cave, and Fern Cave NWRs are currently unstaffed. Biological, public use and CCP planning teams identified the need for additional staff, especially for Key Cave, Sauta Cave, and Fern Cave NWRs. Figure 15 illustrates the current staffing situation at the Complex.

Figure 14. Locations of public use facilities on Sauta Cave National Wildlife Refuge



Figure 15. Wheeler National Wildlife Refuge Complex current staffing chart



* position funded jointly by Refuges and Ecological Services

Approximately 5,000 hours of volunteer time were donated to Wheeler Complex in 2006, including 4,000 hours donated by 53 official refuge volunteers. Visitor Center operations, trail maintenance, litter removal, environmental education, amphibian and reptile monitoring, staffing off-site exhibits, conducting interpretive programs, and providing assistance with the Wheeler Day Camps accounted for the majority of the hours.

Many national wildlife refuges have partnering nonprofit organizations, often called Friends Groups, which serve as advocates and assistants for a refuge. These civic associations have the ability to reach out to the surrounding community for assistance on refuge projects and for local support on conservation issues. Wheeler NWR is fortunate to have an outstanding Friends Group called the Wheeler Wildlife Refuge Association (WWRA). The WWRA was formed in July 1998 and its purpose is “to promote conservation, awareness, and appreciation of Wheeler National Wildlife Refuge and to provide assistance to refuge environmental education programs and other conservation efforts on the refuge.” By the end of December 2005, membership totaled 120, including 11 life members.

Funding

Each year Wheeler NWR receives its own specific budget (Table 9). Management actions on the other three refuges (Key Cave, Sauta Cave, and Fern Cave), except special project-specific monies, are normally funded from within the Wheeler NWR budget. No additional monies are directed for use on the satellite refuges.

Table 9. Wheeler National Wildlife Refuge funding for fiscal year 2005

| Description | Amount |
|--|--------------------|
| Private Lands | \$40,000 |
| Specialized Contaminants | \$5,000 |
| Refuge Operations | \$1,032,100 |
| RONs-04 | \$126,500 |
| CCP Planning | \$80,000 |
| Volunteer Support | \$2,500 |
| FLEX - Roads | \$165,300 |
| Facility Enhancement | \$6,900 |
| Maintenance Management | \$122,300 |
| Deferred Maintenance | \$584,400 |
| Heavy Equipment Maintenance | \$92,600 |
| Small Equipment Maintenance | \$50,000 |
| Total Refuge Complex Operating Budget | \$2,307,600 |

Facilities

The present Complex headquarters administrative office was constructed in 1980 and is not large enough to house the present staff. An expansion project is currently underway. The Complex has one maintenance shop compound that houses and maintains Complex vehicles and equipment.

A 10,000-square-foot Visitor Information Center called the Givens Interpretive Center and a Wildlife Observation Building serve as the hub for public use activities. Rehabilitation projects for these facilities are currently underway. Furthermore, Wheeler NWR has two permanent residences that were constructed in 1941 and 1942. Both residences are scheduled for replacement in the near future.

Interior Roads, Trails, and Water Control Structures

The Wheeler Complex contains over 100 miles of roads and dikes maintained for public access and water management capabilities. Many interior roads were originally constructed to facilitate farming and timber-harvest programs. Some roads provide all weather access with a minimum clearance for two-wheel drive vehicles. However, many roads on Complex lands are impassible to two-wheel drive vehicles during wet weather and some roads are impassible to four-wheel drive vehicles during wet weather. Road maintenance is expensive and time-consuming and in some areas on a few refuges is only possible in late summer during the driest conditions.

Complex staff devotes a large portion of its time to road maintenance (e.g., grading, mowing, and spraying), particularly on Wheeler NWR where soil texture, flooding, and heavy traffic use can damage roads in a short amount of time. To control water levels in the 16 waterfowl impoundments (~2,000 acres) on Wheeler NWR, 20 WCS in the form of screwgates and stoplog structures are maintained.

Refuge Revenue Sharing

By law the refuges in the Wheeler Complex are exempt from paying property taxes, and instead make in lieu of payments to Jackson, Lauderdale, Limestone, Madison, and Morgan Counties through the Refuge Revenue Sharing Act established by Congress (Table 10). This program provides a method of collecting monetary receipts from revenue generating activities on refuges within the nation, pooling them together, and paying them out to counties containing refuge lands.

Payment for acquired land is computed on whichever of the following formulas is greatest: (1) three-fourths of one percent of the fair market value of the lands acquired in fee title; or (2) 25 percent of the net refuge receipt collected; or (3) 75 cents per acre of the lands acquired in fee title within the county. If the receipts generated on refuges do not meet the entitlement amount, Congress may approve additional funds to make up the shortfall.

Table 10. Wheeler National Wildlife Refuge Complex revenue payments in dollars for Jackson, Lauderdale, Limestone, Madison, and Morgan Counties, Alabama, for the last 5 years

| FY | Jackson | Lauderdale | Limestone | Madison | Morgan | TOTALS |
|------|---------|------------|-----------|---------|--------|--------|
| 2005 | 960 | 4626 | 13580 | 13316 | 51929 | 84,411 |
| 2004 | 850 | 4096 | 12025 | 11791 | 45981 | 74,748 |
| 2003 | 699 | 1922 | 12594 | 12483 | 25365 | 53,063 |
| 2002 | 727 | 2000 | 13103 | 12941 | 26391 | 55,162 |
| 2001 | 779 | 2141 | 14026 | 13853 | 28251 | 59,050 |

Chapter III. Plan Development

SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

Working with governmental partners and the public, the planning team identified a number of issues, concerns, and opportunities related to fish and wildlife management and protection, habitat restoration, recreation, and management of threatened and endangered species. Key issues include invasive plants and nuisance animals, wintering waterfowl management and use of refuge lands, placement of crops for wildlife, protection of threatened and endangered species, urbanization and encroachment, visitor access, wildlife photography, and hunting programs. Additionally, the planning team considered Federal and State mandates, as well as applicable local ordinances, regulations, and plans. The planning team also directed the process of obtaining public input through public scoping meetings, comment packets, and personal contacts. The following is a summary of priority comments from the public scoping meeting and letters received. A complete description of the public involvement process is provided in Section C, Appendix D: Public Involvement - Summary of Public Scoping Comments.

| | |
|--|--|
| Fish and Wildlife Population Management | <ul style="list-style-type: none"> • Provide better control of beavers. • Control the feral hog problem with an extended archery or small-caliber rifle season. • Increase management for wild turkeys and northern bobwhite on Wheeler NWR. • Increase efforts to monitor white-tailed deer population. • Improve wintering waterfowl management. • Protect alligators and other threatened and endangered species. |
| Habitat Management | <ul style="list-style-type: none"> • Improve waterfowl impoundment maintenance. • Eliminate invasive and exotic plant species. • Prohibit prescribed fire. • Increase prescribed fire efforts. • Eliminate the use of pesticides. |
| Resource Protection | <ul style="list-style-type: none"> • Provide protection for wildlife and cultural resources from trespassing and from littering/dumping. • Monitor contamination issues. • Increase law enforcement activities (i.e., hunting and fishing compliance checks). |
| Visitor Services | <ul style="list-style-type: none"> • Expand areas for horseback riding. • Prohibit all motorized vehicles. • Prohibit hunting. • Provide a youth waterfowl hunt. • Extend the small game hunting season. • Provide better access by opening gates earlier in the year. • Provide more opportunities for wildlife photography. |
| Refuge Administration | <ul style="list-style-type: none"> • Increase refuge staff. • Increase road maintenance. |

All comments received during the public scoping period were considered, however, some issues important to the public fall outside the scope of the decision to be made within this planning process. The Service developed a plan that attempts to balance the competing opinions regarding important issues, while meeting the refuges' purposes and other requirements and mandates. The team identified those issues that, in the team's best professional judgment, are most important to the Wheeler Complex. A summary of the priority issues for the Complex to address over the 15-year life of the CCP follows.

FISH AND WILDLIFE POPULATION MANAGEMENT

Waterfowl

Management actions for waterfowl at Wheeler NWR are guided by the refuge's overall purpose. A major portion of the refuge is dedicated in providing seasonally flooded croplands, moist soil, and forested wetlands to meet the foraging, resting, loafing, and breeding needs of waterfowl. Lack of water level control, human disturbance, and the proliferation of invasive plant and animal species are several management issues that compound waterfowl management at Wheeler Refuge.

Waterbirds

Management of habitat on Wheeler NWR for waterbirds (colonial waterbirds, marsh birds, and shorebirds) is also important for meeting the refuge's purposes. Wildlife management step-down plan objectives for waterbirds should guide future operation and management actions. Lack of water level control, human disturbance, and the proliferation of invasive plant and animal species are several management issues that compound waterbird management at Wheeler NWR. In addition, the loss of off-refuge habitat and the possibility of contamination from DDT may have led to a decline in waterbird populations.

Quality shorebird habitat is limited on Wheeler NWR especially during fall migration. In the late summer and early fall, the best shallow-water sites for shorebirds are in some form of agriculture and there is a lack of mudflat habitat on the refuge; resulting in a shorebird habitat shortage. In the past TVA would begin drawdown of the Wheeler Reservoir in mid-July. Currently, TVA does not begin to lower the water levels until after Labor Day weekend in September. This action greatly reduces the amount of available habitat for shorebirds during peak migration.

American Woodcock are showing long-term declines in the eastern United States. Population declines are thought to be the result of land use changes associated with land conversion and the maturing of forest habitats. Although mature bottomland hardwoods are scarce on Wheeler NWR, birds may use old fields and agricultural fields as nighttime foraging habitat.

Landbirds

Landbirds (including forest birds, grassland birds, and scrub-shrub birds) as a group are of special management concern. Many species of landbirds are experiencing long-term declines as a result of widespread habitat loss, particularly the loss of bottomland hardwood forests and riparian woodlands, as well as early successional habitats, such as grasslands and scrub habitats. Results from the 2003 Biological Review reported that current conditions of the forests on Wheeler NWR are mid-successional and considered to be of poor quality for most priority landbirds. In addition, the loss of off-refuge habitat and the lack of information concerning the life history requirements of landbirds compound landbird management at Wheeler NWR.

One of the grassland-dependent bird species of concern on Wheeler and Key Cave NWRs is the northern bobwhite. The northern bobwhite has traditionally been one of the most popular game birds in the south. Around the turn of the twentieth century, northern bobwhite numbers reached all-time highs, but since then they have been in constant decline. For the last several decades, bobwhite and many other small game species associated with grassland habitats have declined in population. In fact, North American Breeding Bird Survey data indicates that a rangewide decline of 3.0 percent annually has occurred between the years of 1966 and 2003 for the northern bobwhite (Sauer et al., 2004). While many factors have contributed to this decline, including predators, pathogens, and pesticides, deteriorating habitat quality is the primary cause of decline. Furthermore, the potential exists for overharvesting this species on these refuges.

Amphibians and Reptiles

Amphibian and reptile management and conservation are of great interest due to apparent global declines in populations. Habitat loss, fragmentation, and degradation appear to be the primary factors in declines. This group of animals requires quality wetland habitat for their survival and they also serve as important indicators of environmental health. Comprehensive inventories, monitoring, and surveys are currently not available for amphibians and reptiles on Wheeler Complex lands.

Threatened, Endangered, and Imperiled Species

Recovery and protection of threatened and endangered species are important responsibilities delegated to the Service. The Alabama cavefish, which inhabits the underground pools in Key Cave, is the rarest American cavefish and one of the rarest of all freshwater fish. The only known location of this cavefish is Key Cave. Surveying and monitoring efforts have been extremely difficult and population levels are unknown at this time. Furthermore, the water recharge zone for the Key Cave aquifer is designated as high hazard, meaning that degradation of water quality is a major concern.

Two priority endangered bat species are found in caves located on Complex lands. The gray bat can be found on all refuges in the Complex and the Indiana bat has been documented at Sauta Cave NWR. Since its placement on the endangered species list in 1976, the gray bat has become of particular concern. Its population decline is believed to be due primarily to human disturbances such as: vandalism, excessive pesticide use, overall insect prey decline due to pollution, and cave commercialization. The Indiana bat was added to the Federal endangered species list in 1967. Its dwindling population continues to cause concern and support its protection at Sauta Cave NWR. Its decline has many different contributing factors, including the commercialization of roosting caves, destruction of habitat by vandals, disturbance from spelunkers, and suspected insecticide poisonings.

American alligators are found on and are reproducing on Wheeler NWR. The presence of this species has been controversial with some members of the public opposing its presence and others favoring it. The natural range of this species may not include Wheeler NWR and its presence may be the result of introductions. Recently, two bald eagle nests were found on Wheeler NWR. Disturbance of these nests by human activities is a concern.

Two threatened plants have been documented on the Complex. A healthy population of Price's potato-bean is currently located on Sauta Cave NWR and possibly a few remaining American Hart's tongue-fern plants are located at Fern Cave NWR. Two decades ago, 20 American Hart's tongue-fern plants were documented; however, the most recent survey was unable to find any plants. The disappearances are most likely the result of unscrupulous plant collectors. However, the plant may still be present in the form of spores in the soil and may produce plants in future years. Past attempts to propagate this plant have failed.

Water in and around Wheeler NWR contains, may contain, or once contained many species of freshwater mollusks and snails. Three of these species are endangered (ring pink, rough pigtoe, and pink mucket pearly mussel). The ring pink no longer occurs in Alabama, but at least one historical record (1904) in the Daphne Ecological Services' database places this species in the Tennessee River in the vicinity of the refuge. Historical records (1925) for the slabside pearylmussel and fine-rayed pigtoe indicate these species were found in refuge waters. The fine-rayed pigtoe occurred in Limestone Creek off the western tip of the Beaverdam Peninsula. Construction and operation of the Wheeler Dam has negatively impacted these species.

Invasive, Exotic, and Nuisance Animals

At the present time, the Wheeler Complex does not have a concise inventory or a quantitative analysis of the invasive, exotic, and nuisance animal species that occur on each refuge. Some of the more problematic animal species known to occur on Wheeler Complex include: beavers, feral hogs, feral cats, and resident Canada geese.

Beaver populations are causing negative impacts to refuge resources. Without adequate control, beaver populations on Wheeler NWR will increase to a point that results in unacceptable levels of habitat damage. Trapping efforts by staff, by volunteers, and through a contract with USDA's Wildlife Services have not effectively reduced the population levels. Feral hog numbers have been increasing over the past several years at Wheeler and Key Cave NWRs. Extensive habitat destruction has been documented on both refuges. Trapping efforts by staff and volunteers have not effectively reduced losses to habitat. In addition, Wheeler NWR has a problem with free-roaming and feral cats in some areas, particularly those adjacent to developed residential areas. Free-roaming and feral cats can have a devastating impact on small bird, amphibian, reptile, and mammal populations. This problem is expected to get worse as urban and residential development continue adjacent to the refuge's boundary.

A more recent nuisance animal problem has been the establishment of resident Canada geese in the Tennessee Valley and on Wheeler NWR. Resident geese do not migrate to northern nesting grounds, but remain locally year-round. The refuge's resident population is increasing dramatically and is seriously affecting moist-soil plant production in refuge impoundments. Resident geese are also responsible for damaging agricultural crops planted to provide critical forage for migrating and wintering waterfowl. In addition, their fecal droppings can degrade overall water quality and increase the potential for human and avian diseases transmitted by fecal material. Some of the diseases may include cryptosporidiosis, giardiasis, and chlamydiosis (Conover and Chasko 1985; Cooper and Keefe 1997, and Hailu Kassa et al., 2007).

Surveys and Monitoring

The staff at Wheeler Complex currently conducts some limited surveys and incidental monitoring to document the populations of certain species and species groups. For example, Wheeler NWR has been monitoring waterfowl populations since the fall and winter of 1947-48. Until recently, waterfowl surveys were generally conducted aerially. However, due to the difficulty of finding pilots and/or planes in the area that meet all Department of the Interior (DOI) safety requirements, most waterfowl surveys are now performed on the ground.

Since many, but not all, areas utilized by waterfowl can be observed from the ground, these types of surveys likely give a good index of numbers of birds on the refuge. In addition to waterfowl surveys, limited surveys and incidental monitoring are also conducted for shorebirds and landbirds. The Complex lacks baseline information upon which to base many management decisions.

HABITAT MANAGEMENT

Cropland Management

Farming is an integral part of Wheeler NWR's management program and has been used for over 50 years to meet refuge goals. It provides food, browse, cover, and resting areas for waterfowl and other wildlife species. As the number of migratory Canada geese has declined from an average population of 35,000 in the late 1950s through the late 1980s to current averages below 5,000, the need for a large upland farming program has somewhat diminished.

Reservoir Management

A recent TVA reservoir operations study led to the raising of water levels in Wheeler Reservoir earlier in the spring and a later drawdown in the fall than in the past. Currently, TVA begins to raise the water in the reservoir in about early April so that full pool (556 feet MSL) is reached around April 15. The water is then lowered in early September so that low pool (552 feet MSL) is reached in mid-September. This action created a number of challenges to properly managing wildlife on the refuge.

For example, one of the critical "hot foods" provided for waterfowl is corn, which will support more waterfowl per acre during the wintering period than any other food. In fact, corn will support nearly eight times as many ducks per acre as millet. It is difficult for Wheeler NWR to fulfill its waterfowl goals, particularly goals for ducks, without providing corn as food. Large portions of the main impoundments on the refuge must be dry during early to mid-spring in order to plant corn in low-lying areas. However, refuge staff must wait until most ducks have left the refuge, usually late-January to mid-February, before water removal can begin.

Wheeler NWR has three options to remove water from impoundments: use portable pumps; use large, permanent pumps located in two key areas; and use gravity. Portable pumps can only be used in small impoundments or those in which most of the water has already been removed. It is very expensive to operate the large, permanent pumps; therefore the refuge can only afford to do this when TVA will help pay the cost, which is from May 1 through September 1. Although these pumps move relatively large volumes of water, it is difficult or impossible to dry the fields in time to plant corn if they contain a lot of water. Large amounts of rain or flooding of the impoundments by high reservoir levels in the spring make it difficult to remove enough water using the large pumps to plant corn. Thus, the more we can use gravity to remove water from the units the better chance we have of drying the appropriate low-lying areas. In addition, costs to operate pumps are less when water can be first removed via gravity. Currently, less time is available to gravity flow water out of the units.

The current reservoir water level management creates other problems for meeting the refuge's wildlife management objectives. For example, the reservoir mudflats are covered by water by the time the majority of shorebirds move through the area in the spring heading north to breed and are also under water when these birds move through during late summer heading south to the areas where they winter. Shorebirds historically fed on these mudflats and in shallow water during these migration periods. Now the areas are covered by water too deep for a majority or all of the species to feed. Furthermore, Canada geese arriving early in the fall would use mudflats along the reservoir to rest. These areas are now inundated in the early fall due to the current reservoir water level schedule.

High water levels over expanded periods of time also create other problems. Erosion of the shoreline along the river and its sloughs increases and makes it more expensive to maintain refuge lands and facilities close to the water. In addition, important archaeological sites located just beneath or adjacent to the bank may be exposed or washed away. Exposure of artifacts makes them more susceptible to illegal collecting activities.

Impoundment Management

Wheeler NWR staff manages water on the refuge to provide habitat for wintering waterfowl, shorebirds, and wading birds through the management of impoundments. In managing these areas, the staff produces moist-soil and flooded cropland that produces natural, desirable vegetation and planted high-calorie “hot food” for waterfowl. Impoundments also benefit colonial waterbirds, marsh birds, and shorebirds.

To grow moist-soil plants, water in the impoundments must be drawn down in the spring to permit germination of wetland plants. The areas are then flooded in the fall just before waterfowl begin to arrive. A lack of water management capability limits both the production of desirable foods and control of undesirable plants. This management objective is difficult to accomplish because TVA manages Wheeler Reservoir in a manner that is essentially opposite that needed for establishment of moist-soil plants that provide food for waterfowl (see reservoir management above).

Grassland Management

Native grasslands are one of the most endangered ecosystems in the mid-south (Harper et al., 2004). Historically, the region contained vast acreages of native grasslands and savannas with scattered trees and shrub cover. Natural fire maintained the grasslands. Today, native grassland acreage has been replaced with non-native grass, such as fescue and Bermuda grass, as well as croplands, forests, and urban development. As a result, several wildlife species dependent upon early successional habitat have experienced population declines.

Old Field/Shrubland Management

Old fields and shrublands are important wildlife habitats that are essential for the survival of many wildlife species. The loss of these habitats through conversion to other land uses and/or through succession is resulting in the decline and disappearance of some wildlife species that are dependent on early successional habitats. In eastern North America over the last 60 years, open habitats (grasslands, savannas, barrens, and shrublands) have declined by 98 percent (Hunter et al., 2001). Wildlife species that use old field habitat types for nesting, feeding, and shelter include mammals, such as the cottontail rabbit, meadow vole, and red fox, and birds species, such as the American woodcock, field sparrow, northern bobwhite, song sparrow, and American goldfinch. Butterflies, such as the monarch and Eastern black swallowtail, also frequent this habitat type.

Forest Management

Constraints on burning and thinning due to logistical or hydrological (i.e., overflow flooding) problems have led to overstocking and shading out of understory species and loss of regeneration in some forested areas. Understory shrubs and trees are highly important to nesting and foraging neotropical migratory birds. It is unknown whether or not management activities are resulting in an appropriate forest structure, composition, and associated understory for floodplain forest conservation when they are implemented on an overflow refuge such as Wheeler NWR.

Karst Formations (Caves and Sinkholes)

Cave habitats are of tremendous importance to many invertebrates, amphibians, and mammals. Many species are only known from one or two caves. For example, the Alabama cavefish has only been found in Key Cave and the Cave Springs spider has only been found in Cave Springs Cave. The health of these underground habitats is heavily influenced by surface activities. Airflow, microclimate, water quality, organic influx, and hydrology can all be impacted by land management within the recharge area (ADWFF 2005). In addition, caves depend on outside sources of plant material and bat guano for energy sources and are threatened by any changes in the quantity and quality of water from terrestrial sources (Kingsbury and Gibson 2002). Land use changes, more importantly urban growth, in surrounding landscapes are negatively impacting karst formations. This problem will only get worse as populations grow and urban sprawl continues to alter landscapes.

Invasive and/or Exotic Plant Species Management

Exotic, invasive, and nuisance species negatively impact native habitats and wildlife through habitat disturbance and destruction, through direct mortality, and by out competing native plant species. At the present time, the Complex does not have a concise inventory and/or quantitative analysis of the invasive or exotic plants that occur on each refuge. Some of the invasive or exotic plant species known to occur on the Wheeler Complex include: Chinese privet, kudzu, bamboo, alligatorweed, thistles, American lotus, Japanese honeysuckle, Sericea lespedeza, Bermuda grass, Johnsongrass, and Eurasian watermilfoil. The presence and rate of spread of some of these species is a concern.

RESOURCE PROTECTION

Law Enforcement

Illegal activities that typically occur in urban areas also take place on the Complex, in addition to refuge specific violations. The majority of cases made by law enforcement officers (LEOs) in the recent past have been trespass due to possession of alcohol or drugs, hunting related violations, searching for archaeological artifacts, public indecency and lewdness, littering, and possession of firearms. As the population continues to grow in northern Alabama, illegal activities on the Wheeler Complex are expected to increase.

Currently, the Wheeler NWR Complex is limited to two full-time LEOs. Fortunately, other local and state LEOs are available to back-up Service officers and help enforce local and state laws and regulations. In some cases, such as operations to curtail public indecency, drug use, and/or violations of the Endangered Species Act (ESA), Service special agents and/or LEOs from other national wildlife refuges may assist. The current staff of two LEOs is insufficient to address current law enforcement issues, much less the rise in these issues anticipated to increase with the growth in the area's population.

Urbanization

Wheeler NWR Complex has some very serious challenges confronting it, many related to the urban environment in which it is located. The cities of Decatur, Florence, Huntsville, Madison, and Scottsboro continue to increase in population. Commercial, industrial, and residential developments continue to destroy or degrade farmland and natural areas at an alarming rate. Although many portions of the Complex are still surrounded by large agricultural tracts, this is likely to decline at an increasing rate over the next 10-20 years.

One of the many problems associated with urbanization are requests for new access rights-of-way (ROW) or easements on refuge lands and waters. For example, port authorities in Madison County have requested that a new ROW across Wheeler NWR be approved in order to construct and operate a port on the Tennessee River. Complex management has deemed this use to be inappropriate. Rights-of-way and other easements have the potential to further fragment habitats and negatively impact native wildlife. As the population continues to explode in this area, more requests for ROW or other easements will be initiated. Currently, there are approximately 60 existing ROW or ROW easements that cross Wheeler NWR.

Another issue directly related to urbanization is an increase in sedimentation in the waterways from soil erosion. This problem is most evident at Wheeler NWR. As more and more housing and industrial developments are built in close proximity to refuge lands, increased levels of sedimentation occur. This greatly degrades habitats such as streams, creeks, sloughs, and bays along the Tennessee River both outside and within the boundaries of the refuge.

A rise in residential development and population levels also brings other impacts. Increases in contaminants from increased applications of fertilizers and pesticides on lawns, runoff from impervious surfaces carrying oil and other harmful pollutants, and excessive nutrients from septic tanks and sewer systems are anticipated. Encroachment onto the refuge lands from free-roaming and feral dogs and cats are becoming more common and illegal activities such as drugs and alcohol abuse, destruction of refuge property, and lewd behavior are increasing.

Littering is also an increasing problem on the Complex. All sorts of materials, including containers of contaminants such as oil, construction materials, and household trash are dumped on refuges. In addition, large quantities of trash are deposited on Wheeler NWR when the Tennessee River floods and then recedes. Impacts to plant and animal life on Complex lands are currently unknown.

Water Quality/Contaminants

Past and current activities around Wheeler and Key Cave NWRs have resulted in the release or transport of a variety of contaminants to the refuge and its aquatic resources. Environmental monitoring on Wheeler NWR has indicated that several contaminants in water, sediment, and biological tissues exceed levels that may adversely affect fish, wildlife, and habitat quality on the refuge. Sources of contamination concerns on Wheeler NWR include: 1) contaminated runoff and/or leaching from activities at Redstone Arsenal, 2) agricultural runoff containing elevated nutrients and agricultural chemicals from surrounding cropland, 3) storm water runoff from urban areas around the refuge containing a variety of organic and inorganic contaminants, and 4) other industrial activities and discharges.

Redstone Arsenal - Contaminants

Various contaminants assessment programs have identified 298 contaminated sites on Redstone Arsenal (U.S. Department of Defense 1998). The U.S. Army has primary responsibility for 216 of the sites and NASA has responsibility for 82 of the sites. As of 2000, response actions were completed for 110 sites (Olin Corporation 2001). Site assessment, risk assessment, or remedial design activities for the remaining sites are in progress. Contaminants at the remaining sites include a variety of potentially toxic solvents, metals, or organic compounds, which may enter Wheeler NWR as the result of wastewater treatment discharges, stormwater runoff, or migration in groundwater. The threat of contaminants originating from the Redstone Arsenal to fish, wildlife, or habitat quality on Wheeler NWR is not fully understood at this time.

Chief among the contaminant concerns on Redstone Arsenal is DDT contamination in and around the Huntsville Spring Branch and Indian Creek system. The Olin Corporation manufactured this pesticide on Redstone Arsenal between 1947 and 1970. During this period, an estimated release of 417 tons of DDT was discharged into the Huntsville Spring Branch (Olin Corporation 2004). Environmental monitoring in the 1980s demonstrated high concentrations of DDT contamination in water, sediment, and biological samples from the Huntsville Spring Branch and Indian Creek. Concentrations of this persistent, bio-accumulative, and toxic pollutant were well in excess of levels associated with adverse effects to fish, wildlife, and humans.

These findings resulted in the addition of this site to the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation, and Liability Act (i.e., Superfund). Under a 1983 EPA Consent Decree, the Olin Corporation initiated a remediation project in 1987. The primary strategy was to contain DDT contamination by placing clean soil over about 400 tons of DDT-laden sediments in the Huntsville Spring Branch stream channel and excavate a new stream channel around the filled area. Based on Olin's figures, a minimum of 14.5 tons were not isolated by the project (Olin Corporation 2004). It should be noted that the only current fish consumption advisory issued for Wheeler Reservoir by the State of Alabama is for two fish species, largemouth and smallmouth buffalo from the Indian Creek and Huntsville Spring Branch. No consumption of these fish from Redstone Arsenal to the Tennessee River is advised due to DDT contamination.

Agricultural - Contaminants

Wheeler and Key Cave NWRs are both largely surrounded by agricultural land. Cotton, corn, and soybeans are the predominant crops grown by local farmers. Historically, lands that are now part of Key Cave NWR were used primarily for growing cotton. Past cotton farming practices have led to severe soil erosion problems both on and off refuge lands. Initial management efforts at Key Cave NWR were focused on controlling erosion, thus protecting the water entering the underground cave system from contaminants such as chemicals, excessive nutrients, and sedimentation. Water quality monitoring by the U.S. Geological Survey has identified a variety of agricultural pesticides in surface waters near Wheeler NWR. In addition, water quality monitoring by the Service has identified detectable levels of atrazine in surface waters flowing onto Wheeler NWR. The threat to fish, wildlife, or habitat quality on Wheeler and Key Cave NWRs and within Key Cave itself is unknown at this time.

Urban and Industrial - Contaminants

Treated wastewater discharges from Huntsville and Madison cities and stormwater runoff from urban/ industrial areas enter Wheeler NWR through several surface water streams, creeks, and the reservoir. Contaminants, including nutrients, pesticides, metals, and organic pollutants, may be present in the runoff. The threat to fish, wildlife, or habitat quality on the refuge is currently unknown at this time.

Cultural Resources

Refuges in the Wheeler Complex contain cultural resource sites dating from prehistory to very modern times: from Native American burial mounds and shell middens to shelters, cemeteries, and civil war mines. Looking to the future, issues to be addressed involving the Complex's historical and archaeological resources include the potential for disturbance, vandalism, and theft. In addition, information on the locations of other potential cultural resource sites is unknown; especially at Wheeler NWR where the locations of potential Native American burial mounds and shell middens may be unknown.

Resource Protection

Several areas within and adjacent to acquisition boundaries within the Wheeler Complex are threatened by illegal and uncontrolled access, wildlife and habitat disturbance, future development, and habitat fragmentation. These areas include the fifth entrance to Fern Cave; the lower reaches of Piney and Limestone Creeks, and the high-risk water recharge zone near Key Cave (see figures 6, 16 and 17).

VISITOR SERVICES

Priority Public Use

The National Wildlife Refuge System Improvement Act of 1997 established six priority public uses on refuge lands when they are compatible and desirable for that specific refuge. These priority uses are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Hunting

As expressed in the public scoping meeting, hunting and fishing opportunities on the Complex are of great public interest. Public comments expressed interest in enhancing hunting opportunities with special youth hunts and by providing additional hunting days for small game. Currently, the public demand for hunting is not greater than the Complex can accommodate and the demand can be met without provisions for limiting participation. Continuing development of surrounding lands has the potential to cause increases in demand. It may become necessary in the future to limit hunter numbers to ensure safe, high quality hunting experiences.

Deer management is often an issue with a variety of user groups. The Complex has received public comments for deer management changes ranging from more or different harvest, to leaving the harvest as is, to not allowing deer hunting at all. Bow hunters often want no gun hunting, or some want special muzzle-loader seasons. Often, deer management comments are associated with trophy hunts, antler limits, and limitations to doe and buck days.

Wheeler NWR does not currently offer turkey hunting, but the public has been requesting a hunt. Quality turkey habitat is limited on the refuge and populations are extremely low.

Waterfowl hunting is not permitted on Wheeler NWR, but there is some demand for it. Waterfowl hunting was permitted in the White Springs Dewatering Unit during waterfowl seasons from November 1964 through January 1969. But the loss of a prime goose use area and other concerns over the impact of hunting on waterfowl populations caused the refuge staff to terminate refuge waterfowl hunts. The prime goose area was the Point Mallard Peninsula that was managed as part of Wheeler NWR until TVA withdrew the property and transferred it to the city of Decatur. During the scoping process for the Draft CCP, the public asked management to consider conducting a youth waterfowl hunt.

Use of all-terrain vehicles (ATVs) on Wheeler NWR is prohibited, except by special permit for handicapped hunters within the special designated handicapped hunting area (500 acres). Provisions for issuing special access permits are on file at the refuge's Visitor Center and headquarters. Some of the commenters during the public scoping asked the refuge to consider limited ATV use during deer season. However, most comments received indicated a strong desire to keep ATVs off all Service Lands.

Figure 16. Potential land conservation areas surrounding Wheeler National Wildlife Refuge

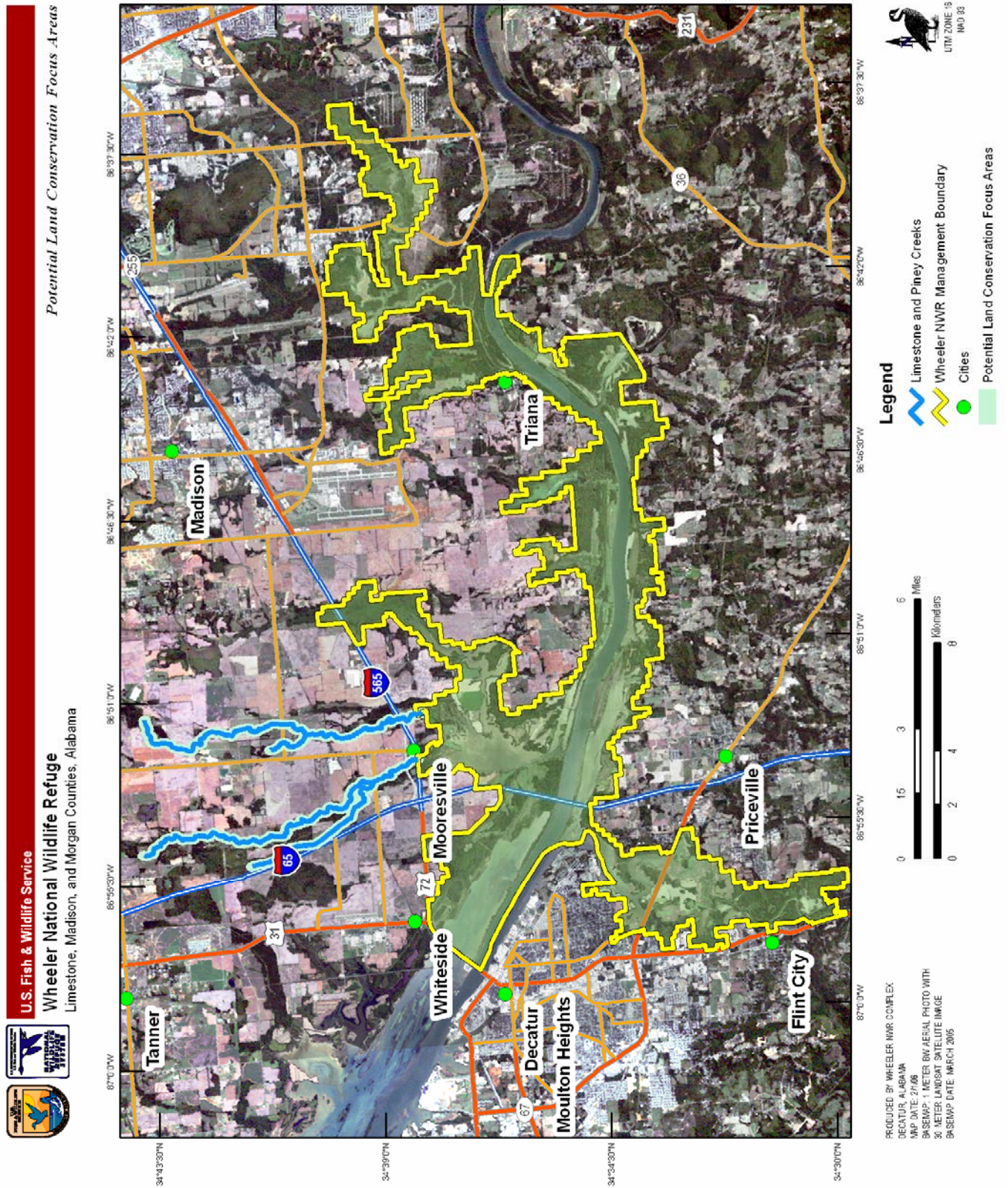


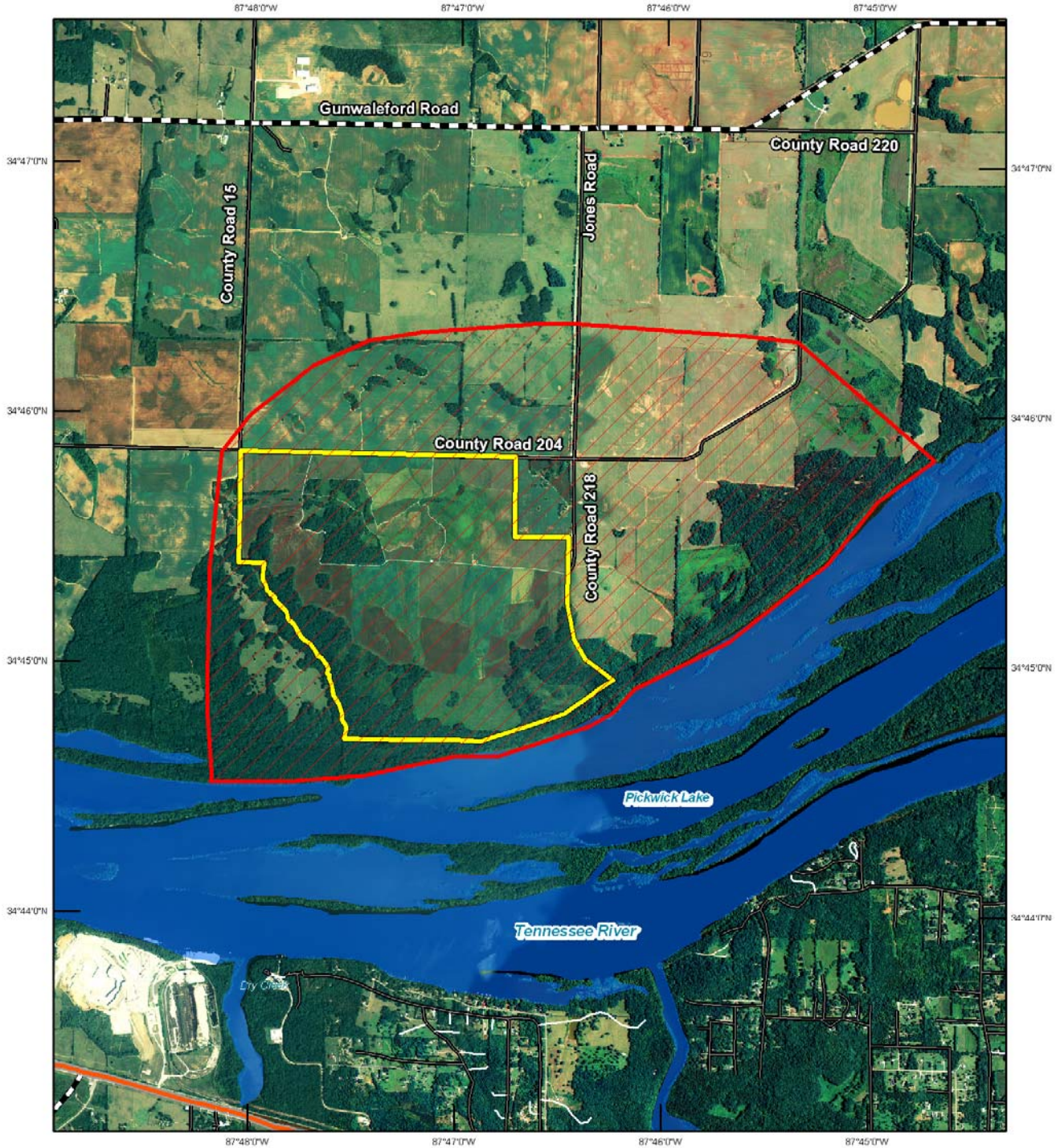
Figure 17. Potential land conservation areas surrounding Key Cave National Wildlife Refuge



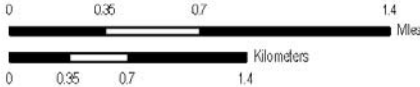
U.S. Fish & Wildlife Service

Key Cave National Wildlife Refuge
Lauderdale County, Alabama

Potential Land Conservation Areas



PRODUCED BY WHEELER NWR COMPLEX
DECATUR, ALABAMA
MFP DATE: 2/1/08
BASEMAP: 1 METER AERIAL PHOTO
BASEMAP DATE: JUNE 2008



Legend

- High Risk / Potential Land Conservation Focus Area
- Key Cave NWR Management Boundary



Fishing

Sportfishing on Wheeler NWR, including method of take, daily creel limits, possession limits, and size limits, is permitted in accordance with State regulations. Challenges associated with meeting the goals of the Service's 2002 Fisheries Program Vision for the Future Plan include addressing local water quality issues, such as sedimentation, contaminants, channelization, and agricultural impacts. Most streams or rivers within Wheeler Complex's boundaries have been channelized or altered. These issues hinder the ability of the Complex to meet the goals of the 2002 Fisheries Program Vision for the Future Plan (USFWS 2002).

In addition, barriers to the natural migration of desirable game fish into refuge waters due to hydrological alterations have resulted in a higher proportion of "rough fish," such as carp, in refuge waters. Parking and boat launching facilities constructed in support of fishing and other uses are adequate and are maintained by the Alabama Division of Wildlife and Freshwater Fisheries under partnership agreements. Requests have been made to improve and upgrade boat launching facilities.

Wildlife Observation and Photography

Wheeler Complex provides the public with many opportunities to conduct wildlife observation and photography within its refuges. Some of the public comments received during the scoping period included: constructing additional permanent photography blinds, establishing additional nature trails, improving the wildlife observation building at Wheeler NWR, and developing an auto tour on Wheeler NWR.

Environmental Education and Interpretation

Wheeler Complex provides an extensive environmental education and interpretation program to educate visitors about the Complex and the Refuge System. Due to limitations of a small public use staff, the Complex relies heavily on a network of local volunteers, student interns, and work campers for the implementation of its public outreach programs. During the public scoping portion of the CCP process, the public requested more off-site environmental education opportunities for areas surrounding Key Cave, Sauta Cave, and Fern Cave NWRs. Road distance (> 50 miles) between the Complex headquarters and the other refuges makes this request a very difficult task.

Visitor Access

Many roads on Wheeler NWR are closed to vehicular traffic seasonally to minimize waterfowl disturbance from human activities and to protect the integrity of the road system during the wet winter months. The roads remain open to foot and bicycle traffic, allowing access to the refuge for compatible public uses. Public comments indicated a desire to relax certain road closures for easier access during the white-tailed deer hunting season.

Several areas on Wheeler NWR are also closed seasonally. For example, the Garth Slough area is closed to all entry from November 15 - January 15 and the area immediately associated with the Visitor Center and Wildlife Observation Building is closed year-round with the exception of the Wildlife Observation Building Nature Trail and the Atkeson Nature Trail. Crabtree Slough and the White Springs Unit are closed to watercraft from November 15 through February 15 and November 15 through January 15, respectively. This action slightly reduces the water acreage available to persons fishing from boats. Fishing is always prohibited in the Waterfowl Display Pool, waters adjacent to the Visitor Center, and around the shoreline of the refuge headquarters and housing units.

The public also requested increased access for horseback riding. Currently, Wheeler NWR is open to horseback riding with limitations. Horseback riding is limited to open gravel and/or paved roads and horses are not permitted to enter closed areas. Issues associated with horseback riding are habitat degradation and conflicts with other uses.

REFUGE ADMINISTRATION

Funding and Staffing

Limited staff, facilities, equipment, water management capability, and other factors have prevented refuges in the Wheeler Complex from better serving refuge purposes and accomplishing many management objectives. Staff shortages are compounded by the necessity of sharing limited equipment and facilities with other refuges in the Complex. Further problems are introduced by the necessity of managing refuge lands that are separated by 50 or more miles. The end result is a negative impact on biological, maintenance, and visitor services programs.

Chapter IV. Management Direction

INTRODUCTION

The Service manages fish and wildlife habitats considering the needs of all resources in decision-making. But first and foremost, fish and wildlife conservation assumes priority in refuge management. A requirement of the National Wildlife Refuge System Improvement Act of 1997 is for the Service to maintain the ecological health, diversity, and integrity of refuges. A refuge is a vital link in the overall function of an ecosystem. To offset the historic and continued loss of habitats within the ecosystem, the refuges in the Wheeler Complex, in conjunction with other public lands and waters, provide a biological safety net for native species, trust resources, and State and Federal listed species. Public uses are allowed if they are appropriate and compatible with wildlife and habitat conservation. The above-mentioned Act identified hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation as priority wildlife-dependent public uses of the Refuge System. Hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are therefore emphasized in this plan.

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

Four alternatives for managing the Complex were considered: Alternative A (Maintain Current Management/No Action Alternative), Alternative B (Maximize Compatible Wildlife-Dependent Public Use), Alternative C (Maximize Wildlife/Habitat Management), and Alternative D (Balance Wildlife/Habitat Management with Compatible Wildlife-Dependent Public Use). Each of these alternatives is described in the Alternatives section of the Final Environmental Assessment (EA). The Service chose Alternative D as the proposed management direction.

Implementing the proposed action would result in Complex lands being protected, maintained, restored, and enhanced for waterfowl; migratory birds; resident wildlife; shorebirds; wading and marsh birds; and threatened, endangered, and imperiled species. Extensive wildlife and plant census and inventory activities would be initiated to develop the baseline biological information needed to implement, monitor, and evaluate management programs on each refuge in the Complex.

All management actions would be directed towards achieving the purposes of each refuge in the Complex, while contributing to other state, regional, and national goals. Cooperation with Alabama's Division of Wildlife and Freshwater Fisheries (ADWFF) for fisheries monitoring, implementing aquatic habitat improvement projects, and conducting game and non-game fish surveys would continue and increase as opportunities become available. Existing migratory bird monitoring, including waterfowl surveys, bald eagle surveys, Christmas Bird Counts, call counts, and breeding bird surveys would continue. Prescribed fire may be used, in conjunction with other refuge management tools, to reduce hazard fuels, restore natural processes and vitality of ecosystems, improve wildlife habitat, remove or reduce non-native species, and conduct research. Suppression of all wildland fires would continue.

Special use permits would be issued on a case-by-case basis to universities, partners, and other interested parties to perform compatible, appropriate wildlife-related research and/or surveying. Research would continue to be encouraged to evaluate contaminant levels and their impacts on fish, wildlife, and plants.

Cultural resource protection efforts would continue, including a partnership with the TVA to conduct bank stabilization projects at Wheeler NWR. Efforts to increase cultural resource protection through education and inventories would be explored. To aid and promote refuge management programs, currently established partnerships with agencies, organizations, and individuals would continue. Additional partnerships would be welcomed. The volunteer program would continue and would likely grow as more individuals become interested in volunteering. Technical assistance for private land management would continue to be offered through the Service's Partners for Fish and Wildlife Program. Efforts to expand the program would be explored.

The general use of all-terrain vehicles (ATVs) would continue to be prohibited on all refuges in the Complex. Key Cave, Sauta Cave, and Fern Cave NWRs would continue to be closed at night and horseback riding would be prohibited on these refuges. New management activities, such as a comprehensive water sampling and monitoring program, would be developed and technologies such as global positioning systems (GPS) and geographic information systems (GIS) would be utilized to establish, document, and monitor conservation measures. A Complex-wide litter control program would be initiated. A large majority of Complex lands would be closed at night and select areas of high waterfowl and goose/cranes use on Wheeler NWR would have area closures extended from November 1 to March 1, slightly reducing acreages for boat access and night bank fishing. However, all six improved boat launching facilities and several other designated night bank fishing areas would remain open at night. These actions would help reduce illegal activities and human disturbance to wildlife.

Habitat management and maintenance programs for waterfowl impoundments, old field, cropland, grassland, and forests would be re-evaluated and step-down management plans would be developed or updated to meet the foraging, resting, and breeding requirements for a variety of species, particularly migratory birds. Law enforcement (LE) activities to protect resources and provide visitor safety would be intensified. Additional LE officers would be required. A study to analyze the impacts of existing rights-of-way (ROW) on resources would be initiated and results would determine if current Complex policy concerning ROW and ROW easements should be altered. Coordination with local planning and zoning departments would be increased to help minimize encroachment.

Under this plan, the priority of land acquisition at Fern Cave NWR would remain focused on first acquiring land surrounding the fifth cave entrance (Surprise Pit). Based on recommendations from the Alabama Comprehensive Wildlife Conservation Strategy, the Wheeler Complex would explore methods to protect lands within the lower reaches of Piney and Limestone Creeks close to Wheeler NWR, as well as lands within the Key Cave high risk water recharge zone close to Key Cave NWR.

The Service would work with partners to explore various methods to protect these resources (e.g., through conservation easements, through technical assistance and advice from the Service to the landowner, and through other methods). [No Land Protection Plan would be developed as part of this CCP. However, if in the future Service acquisition of these lands was determined to be the most appropriate conservation measure, the Service would undertake all required planning activities (e.g., development of appropriate documents and involvement of interested and potentially affected parties, governmental agencies, and landowners in the process).]

Hunting and fishing would continue with greater emphasis on increasing opportunities and enhancing the quality of the experience, including those for youth and disabled hunters/anglers. At Wheeler NWR, the number of hunting days for small game hunting would be increased within the state hunting season framework. Feral hogs would be hunted during both the large game and small game seasons. At Key Cave NWR, the hunting program would be evaluated annually. Results would dictate if the hunting program should be reduced, expanded, or remain the same.

Increased wildlife observation and photography opportunities would result from the construction of three new visitor facilities (a photo blind, a wildlife observation tower, and an auto tour) and the maintenance of existing visitor facilities would continue as budgets allow. Environmental education and interpretation would be expanded by increasing the number of off-refuge programs with local schools and by constructing an environmental education center at Wheeler NWR. New informational brochures would be developed and published for Key Cave, Sauta Cave, and Fern Cave NWRs and visitor access would be improved at Sauta Cave NWR.

Administration plans would stress the need for increased maintenance of existing infrastructure and construction of new facilities. Funding for new construction projects would be balanced between habitat management and public use needs. An additional staff of 19 would be required to accomplish the goals of this alternative.

VISION

The Wheeler National Wildlife Refuge Complex will protect, manage, and, where appropriate, restore native systems of lands and waters to provide habitat for wildlife, fisheries, and plants within northern Alabama for the benefit and enjoyment of present and future generations of Americans. In addition, the Complex will seek partnerships that promote environmental stewardship on non-refuge lands, foster research opportunities to enhance resource management and restoration efforts in the Lower Tennessee-Cumberland Ecosystem, and protect historical and cultural resources of the Complex. When compatible, wildlife-dependent recreational opportunities for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation will be provided, while promoting the public's understanding of the purposes of refuges in the Wheeler Complex and the mission of the National Wildlife Refuge System.

GOALS, OBJECTIVES, AND STRATEGIES

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

These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the National Wildlife Refuge System Improvement Act of 1997; the mission of the National Wildlife Refuge System; the vision of the Wheeler Complex; and the purposes of Wheeler, Key Cave, Sauta Cave, and Fern Cave NWRs. With adequate resources as outlined in Chapter V, Plan Implementation, the Service intends to accomplish these goals, objectives, and strategies within the 15-year life of the CCP.

The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, states that national wildlife refuges must be protected from incompatible or harmful human activities to ensure that Americans can enjoy the Refuge System long into the future. Before activities or uses are allowed on a national wildlife refuge, the uses must be found to be compatible. A compatible use is one that will not materially interfere with, or detract from, the fulfillment of the mission of the Refuge System or the purposes of the refuge [§668ee (1) USC]. "Wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety" [§668dd (d)(3)(A)(iii) USC]. See Appendix E for compatibility determinations.

FISH AND WILDLIFE POPULATION MANAGEMENT

Goal 1. Fish and Wildlife Population Management. Protect, maintain, enhance, and restore healthy and viable populations of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species found within northern Alabama in a manner that supports national and international treaties, plans, and initiatives.

Overview: The Wheeler Complex is home to a large variety of resident fish and wildlife species, including both Federal and State threatened and endangered species. In addition, a wide diversity of habitats provide feeding, resting, and loafing habitat for many species of migratory birds, more specifically wintering waterfowl.

Objective 1.1. Migratory Waterfowl – Over the 15-year life of the plan, provide conservation management to meet population goals of the North American Waterfowl Management Plan (NAWMP) as stepped down through the Central Hardwoods Joint Venture (CHJV) and the Lower Tennessee-Cumberland Ecosystem Bird Management Plan (LTCEBMP).

Discussion: Concern over waterfowl population declines in the 1980s resulted in the establishment of the North American Waterfowl Management Plan (NAWMP), which focused the attention of Federal, State, and private conservation groups on critical wintering and breeding areas. Further efforts led to the creation of joint ventures such as the Lower Mississippi River Joint Venture Evaluation Plan (LMRJVEP) to step down goals and objectives to smaller scales. More recently, a Central Hardwoods Joint Venture Evaluation Plan (CHJVEP) was formed in 2002 to develop goals and objectives for the Central Hardwoods Bird Conservation Region (CHBCR). The CHBCR includes all of the refuges in this CCP. According to the CHJVEP, Wheeler NWR has been identified as an Important Bird Area.

With the exception of the northern bobwhite (Dimmick et al., 2002), global population goals have yet to be stepped down to the level of bird conservation regions by the national and international bird initiatives. However, waterfowl population goals have been stepped down to the level of Joint Ventures and translated to acreage objectives in the past, but the North American population goals are currently under revision and have yet to be quantified for the Central Hardwoods region as a whole (NABCI 2003).

For Wheeler NWR, guidelines for minimum duck-use-day objectives were determined by the 2003 Biological Review Team using a series of step-down plans starting with the NAWMP population objectives. These objectives were further stepped down to the LTCEBMP by using procedures described in the LMRJVEP. Taking into account sanctuary requirements (in addition to foraging requirements), public land managers determined the potential for meeting objectives. Wheeler NWR was then allocated a minimum number of duck-use days based on past wintering waterfowl surveys and available habitat types. These population objectives were translated into minimum habitat objectives for bottomland hardwoods, moist soil, and unharvested crops.

Results outlined in the 2003 Biological Review call for providing adequate foraging habitat to support about 53,000 ducks for 110 days and 29,200 Canada geese for 90 days in the three Alabama counties of Limestone, Madison, and Morgan that encompass Wheeler NWR. Since Wheeler NWR manages primarily for dabbling ducks, the foraging objectives key on this group. Canada goose goals are based on the average annual number of geese observed during the Midwinter Waterfowl Inventory (1985-89). In addition to Canada geese, foraging habitat is also needed to support 3,000 snow geese and an anticipated population of 2,000 sandhill cranes bringing the total to 34,200 for large birds (geese and cranes).

The 2003 Biological Review of the Wheeler Complex, as part of this comprehensive conservation planning process, identified specific strategies needed for Wheeler NWR to provide sufficient winter water, food, sanctuary, resting/loafing, and breeding areas to meet the habitat and population goals of the NAWMP as stepped down by the CHJVEP and the LTCEBMP.

Strategies:

- Participate in LTCE semi-annual meetings and conference calls.
- Update the Wheeler NWR wildlife and habitat management step-down plans.
- Review the LTCEBMP and implement goals and objectives into step-down plans.
- Archive complete digital databases of all waterfowl surveys and habitat use on Wheeler NWR.
- Analyze habitat conditions and waterfowl use to determine if preferred habitat conditions throughout the winter period exist on Wheeler NWR.
- Review population objectives and compare with actual waterfowl use data annually on Wheeler NWR.
- Complete an annual assessment on available forage amounts for both grain crops and moist-soil vegetation on Wheeler NWR.
- Continue efforts to improve water management capabilities in the White Springs and Rockhouse/Buckeye dewatering units, as well as other potential waterfowl habitat sites on Wheeler NWR.
- Maintain a GIS database of all wood duck box locations on Wheeler NWR.
- Maintain a GIS database of all water control structures and water level gauges on Wheeler NWR.
- Ensure continued operation of pumps at the White Springs and Rockhouse/Buckeye dewatering units via TVA cooperative agreements and ensure budget priority for annual operation and maintenance of the pumps and associated facilities on Wheeler NWR.
- Continue to conduct bi-weekly waterfowl surveys on Wheeler NWR.
- Develop a plan to create waterfowl sanctuary areas where human disturbance to waterfowl would be minimal during the critical wintering period (November 15 – March 1) on Wheeler NWR.
- Continue using GPS to calculate acreages for crop shares at Key Cave and Wheeler NWRs.

Objective 1.2. Migratory Waterfowl – Within five years of plan approval, protect a minimum of 2,000 acres of habitat at Wheeler NWR so that disturbance to ducks, geese, and cranes from human activities would be minimal during the critical winter period (November 15 – March 1).

Discussion: The establishing legislation for Wheeler NWR is “for use as an inviolate sanctuary for migratory birds.” Sanctuaries, areas designated for protection so that human disturbance is minimal, are necessary to reserve the habitat elements essential for waterfowl survival and to serve as reservoirs from which populations can be replenished. Sanctuaries also protect waterfowl from over-harvest (Munro 1964). Sanctuaries have long been considered an important part of waterfowl management (Bellrose 1954), although research on their role in maintaining populations has received limited attention.

Excessive disturbance has been shown to reduce the fat storage and feeding success of greater snow geese (Feret et al., 2003) and increase energy expenditure by several species of migrating and wintering waterfowl (Havera et al., 1992, Kahl 1991). Undisturbed areas provide wintering waterfowl with food, cover, and water, and provide areas for pair bonding. Waterfowl in sanctuary areas can maintain vital fat reserves that they will need for long distance migration and is necessary for hens to produce eggs on the nesting grounds after long migrations.

Strategies:

- Expand the closure of Crabtree Slough for boat access (November 15 – March 1).
- Evaluate other areas on the refuge with high waterfowl use, such as White Springs, Penny Bottoms, Flint Creek Island, Rockhouse/Buckeye/Thorson Arm units, and Cain Slough for potential closures.
- Post signs in appropriate areas of closure.
- Use GIS and GPS technologies to determine possible locations for future closures.

Objective 1.3. Migratory Waterfowl – Over the 15-year life of the plan, continue efforts to document waterfowl use of the various habitats on Wheeler NWR.

Discussion: The Fish and Wildlife Service establishes hunting seasons and bag limits for waterfowl based on factors like species number, reproductive success, and survivorship. Various studies are conducted to learn more about waterfowl populations, including their movements.

Wheeler NWR staff conducts bi-weekly winter waterfowl surveys each year. Numbers of ducks, geese, and cranes are recorded by water management unit. Staff also supports waterfowl population survey efforts by banding wood ducks. Migratory bird managers determine how many wood ducks of various age and sex classes must be banded on Wheeler NWR each year. Each summer, refuge staff commits time and resources to band wood ducks. This information is provided to the Fish and Wildlife Service's and/or U.S. Geological Survey's migratory bird managers for further study.

Strategies:

- Conduct ground-based refuge-wide waterfowl surveys bi-weekly from October - March, and record species numbers by major units within the refuge and total numbers.
- Participate in the official mid-winter waterfowl survey, working with the State to report data in accepted formats.
- Monitor wood duck nest boxes regularly before, during, and after the breeding seasons.
- Meet wood duck banding quotas during the July 1 - September 30 pre-season banding period thereby contributing to the achievement of State, regional, and national flyway goals.
- Work with the State to obtain assistance with aerial surveys and provide species numbers by major refuge units.
- When conducting ground counting/inventories in addition to or in lieu of aerial surveys, describe the procedures and repeat using the same procedures for each count.

Objective 1.4. Migratory Waterfowl – Over the 15-year life of the plan, provide adequate moist-soil and agriculture habitats to meet the foraging needs of 53,000 ducks for 110 days and other habitats that are needed for loafing, roosting, and molting on Wheeler NWR.

Discussion: Although ducks will feed in fields, they much prefer to forage in shallow water. Unlike geese, many duck species will feed near or in cover where they can avoid aerial predators. At Wheeler NWR, corn, milo, and millet are left standing in areas that will flood in the fall and winter. These crops are left mainly in water impoundments not being managed for moist-soil vegetation. In the refuge impoundments that are managed for moist-soil vegetation, production is limited due to the lack of water supply and water level control.

Strategies:

- Provide approximately 1,000 acres of flooded moist-soil habitat that averages 400 pounds of seed per acre.
- Provide 5-10 acres of flooded habitat in at least one moist soil unit during the August-October period for early arriving ducks.
- Provide a minimum of 114 acres of flooded, un-harvested corn, which averages at least 100 bushels per acre or an equivalent amount of other grains.
- Explore the possibility of providing cooperative farmers a larger share of upland grain in return for planting crops in lower sites that can be flooded.
- Continue to flood about 1,400 acres of timber that provides good cover as well as mast and invertebrate food resources.
- Consider alternating flooding years in areas where the refuge controls flooding and/or stagger the flooding period.
- Improve water supply and control in White Springs and Rockhouse de-watering units.

Objective 1.5 Nesting/Resident Waterfowl – Over the 15-year life of the plan, provide nesting and brood rearing habitat (200 nest boxes) for wood ducks to support objectives of the North American Waterfowl Management Plan at Wheeler NWR.

Discussion: Early in the 20th century, nesting cavities for wood ducks became scarce. Many land managers, including Wheeler NWR, began placing wood duck nest boxes in the appropriate habitat. Today, Wheeler NWR maintains about 226 boxes. These boxes are checked at least once each year to determine how many were used and the amount of reproduction that occurred.

Strategies:

- Provide nesting, brood-rearing, and feeding areas for wood ducks in key areas of the refuge.
- Before the breeding season, inventory wood duck boxes for proper predator guards and nesting material, and repair as necessary.
- Conduct at least one wood duck nest box check after the breeding season to ensure the box and predator guards are in good condition and to refresh nesting material.
- Continue to flood about 1,400-acres of timber that provide good cover as well as mast and invertebrate food resources.
- Do not harvest older trees that may form natural cavities.
- Follow the publication entitled “Increasing Wood Duck Productivity: Guidelines for Management and Banding-USFWS Refuge Lands (Southeast Region)” (Division of Migratory Birds 2003) for nest box programs.
- Reduce the number of wood duck boxes maintained from 226 to 200.

Objective 1.6. Migratory Geese/Cranes – Over the 15-year life of the plan, provide adequate corn and wheat browse to meet the needs of a maximum of 34,200 birds, including 24,200 Canada geese, 3,000 snow geese, and 2,000 sandhill cranes for 90 days on Wheeler NWR.

Discussion: Geese require a high-energy food source such as corn, but will also feed on green plants such as winter wheat. Corn must be located in the middle of relatively large (depending on shape, about 20 acres or larger), open fields because geese are wary of predators that may be lurking in hedgerows, woodlands, and other types of cover. In addition, winter wheat is planted by either the Wheeler NWR staff or the cooperative farmers each year in areas that need to be supplemented.

Strategies:

- Provide 130 acres of unharvested corn that averages at least 100 bushels/acre in traditional goose use areas.
- Provide approximately 300 acres of winter wheat browse in traditional goose use areas.
- Keep habitats open in traditional goose use areas.
- Reevaluate the foraging needs of geese and cranes every five years. Once migratory Canada geese peak populations have remained below 5,000 for 10-15 consecutive years, adjustments to the foraging needs for Canada geese should be considered.
- Increase the use of contract or force account farming in the next 5-10 years.

Objective 1.7. Colonial Waterbirds (including the bald eagle and osprey) – Within five years of plan approval, increase waterbird management capabilities and monitoring efforts on Wheeler NWR.

Discussion: In the past, several colonial waterbird rookeries were present on Wheeler NWR. However, about 55 years ago they disappeared. In 2002, one great blue heron rookery (with four nests) was discovered in the Blackwell Swamp area. In 2006, great egrets used this same rookery to nest. No other rookeries have been documented on the refuge.

Water impoundments, wetlands, and backwater areas located on Wheeler NWR provide foraging habitat for wading birds. Thousands of wading birds gather to feed in the spring and summer months, especially during water drawdown in the impoundments.

There are potential long-term effects of the previous DDT production at Redstone Arsenal on colonial nesting waterbirds, bald eagles, osprey, and colonial nesting long-legged waders. Breeding has not recovered in these species/groups since the 1950s. There also may be exposure to non-breeding populations from elsewhere.

Strategies:

- Designate one refuge impoundment that would be managed for colonial waterbirds.
- Increase the monitoring of colonial waterbirds by conducting monthly surveys.
- Conduct studies to determine why colonial waterbirds no longer nest in large numbers downstream of Redstone Arsenal and along the Tennessee River.
- Investigate the role that continued presence of DDT and breakdown products may be playing on the present status of fish-eating species within Wheeler NWR relative to sites upstream of Redstone Arsenal.

Objective 1.8. Marsh Birds (including Wilson's Snipe) – Within five years of plan approval, investigate the potential importance of the Wheeler Complex for supporting priority marsh bird species.

Discussion: During the last several decades, overall loss of freshwater emergent wetlands has increased due to development pressures. King rail, least bittern, pied-billed grebe, American coot, and purple gallinule are species in decline locally and/or regionally due to the loss of freshwater emergent wetlands. Most of the potential marshbird habitats on Wheeler NWR do not support tall emergent vegetation. Current management practices, limited staffing, and less than optimum water control does not allow managers to effectively provide this type of habitat. However, with improvements to Wheeler's water management system, the necessary management attention to address the habitat needs of marshbirds could be achieved.

Wheeler Refuge would be a good location to support habitat for marsh bird species, in conjunction with waterfowl objectives. Studies are needed to determine species composition and abundance on the refuge and if other habitats on the refuge support breeding marsh bird populations. The White Springs Dewatering Unit may serve as a candidate for managing focus species, including potential breeders, such as king rail and least bittern and transient species, such as yellow and Virginia rails, sora, and LeConte's sparrow.

Strategies:

- Designate one refuge impoundment at Wheeler NWR that would be managed for marsh birds.
- Increase monitoring of marsh birds by conducting monthly surveys.
- Institute marsh bird surveys in the White Springs Dewatering Unit of Wheeler NWR.
- Locate any additional permanent marsh on Wheeler NWR with taller vegetation and determine the presence of king rail and least bittern during the breeding season.
- Work with the partners to initiate research into marsh bird use of different habitat types on Wheeler NWR.

Objective 1.9. Shorebirds (including the American Woodcock) – Within three years of plan approval, increase shorebird management capabilities and monitoring efforts.

Discussion: Shorebirds currently forage on mud flats and in moist-soil areas on Wheeler NWR. Although limited, opportunities do exist for managing shorebirds in waterfowl impoundments and in fallow crop fields. Providing suitable conditions would include disking dead vegetation and conducting a detailed schedule of water level manipulations. Water level management would have to be improved in order to accomplish this objective.

The American woodcock is a migratory game bird that occurs throughout the forested portions of the eastern United States. Woodcock populations have declined in this region for the past 40 years. Population declines are thought to be the result of land use changes associated with land conversion and the maturing of forest habitats.

In 1990, the American Woodcock Management Plan was completed, setting an objective to protect and enhance wintering and migration habitat on public lands. The plan also set objectives to inventory and monitor woodcock habitat and develop management demonstration areas; however, objectives have not been stepped down to states or to individual refuges.

Strategies:

- Designate one refuge impoundment at Wheeler NWR that would be managed for shorebirds.
- In concert with Swan Creek Wildlife Management Area (WMA), increase monitoring of shorebirds by conducting monthly surveys under guidelines established by the International Shorebird Survey (ISS) protocols during the birds' northbound (mid-March to late-May) and southbound migration (early-July to late-October) periods.
- Implement survey protocols for the American woodcock during migration and winter to determine the level of occurrence on Wheeler and Key Cave NWRs.
- Conduct woodcock winter surveys to ascertain its occurrence on Wheeler and Key Cave NWRs and nocturnal use of select fields.
- Initiate an American Woodcock Management Study on Complex lands.

Objective 1.10. Forest Breeding Birds – Within eight years of plan approval, determine the status of forest breeding landbirds at Wheeler NWR and take necessary actions to improve their status via habitat management.

Discussion: Forested habitats on Wheeler NWR are predominantly bottomland hardwoods consisting of intermediate and early successional stages. In general, forest breeding landbird issues include: defining forest conditions; addressing structural issues, including development of native understory regeneration and growth; retaining the largest trees; reducing forest fragmentation; and replacing Chinese privet with switchcane and/or other native understory.

Strategies:

- Establish point counts in various sized forest patches to sample bird species presence by the spring of 2009.
- Establish six to 10 point counts in 6 forested blocks \geq 1,000-acres, and six to 10 point counts in 6 forested blocks $<$ 1,000-acres.
- Determine if any relationships exist among species or species groups for increasing forest patch size.
- Determine any relationships among priority species with habitat characteristics that could be managed for in experimental sites.
- Develop a closer working relationship with Redstone Arsenal's Directorate of Public Works-Environmental Division's Department of Natural and Cultural Resources to compare bird use of forest blocks larger than those found on Wheeler NWR.
- Establish breeding bird surveys or Monitoring Avian Production and Survival (MAPS) in at least one large and one small forest block and determine reproductive success or measures of post-breeding survival.

Objective 1.11. Forest Wintering Landbirds – Over the 15-year life of the plan, continue to contribute to the regional understanding of forest wintering landbird status and trends in the southeast.

Discussion: Forest wintering landbirds are likely to benefit from the same forest management techniques proposed above for forest breeding species, such as development of larger forest blocks; improvement of understory growth; and development of a more complex forest structure. One of the forest breeding species of concern that could benefit from population trend analysis is the rusty blackbird.

Strategies:

- Determine rusty blackbird population trends (birds per party hour) based on Wheeler NWR Check Christmas Bird Count (CBC) data.
- If negative trends are detected based on CBC data, determine rusty blackbird foraging and roosting use of Wheeler NWR.

Objective 1.12. Forest Transient Landbirds – Over the 15-year life of the plan, continue to contribute to the regional understanding of forest transient landbird status and trends in the southeast.

Discussion: Wheeler NWR's forest resources support transient landbirds when they pass through during migration. These birds should benefit from a more diverse forest structure over time. Even smaller patches would contribute to these species. There appear to be opportunities to conduct migration surveys at Wheeler NWR with volunteer birders.

Strategies:

- Establish at least one migration survey transect on Wheeler NWR following protocols used by Gulf Coast Bird Observatory. Priority sites include Dancy Bottoms Nature Trail and a second site along a road (HGH) in the Blackwell-Buckeye area.
- Determine any relationships among species for increasing forest patch size.

Objective 1.13. Grassland Landbirds – Within eight years of plan approval, increase management efforts for grassland dependent landbird species on Key Cave and Wheeler NWRs.

Discussion: Grassland birds were historically found in vast numbers across North America. Today, these birds have shown steeper, more consistent, and more geographically widespread declines than any other group of North American species. These losses are a direct result of the declining quantity and quality of habitat due to human activities, such as conversion of native prairie to agriculture, urban development, and suppression of naturally occurring fire. Opportunities exist at Key Cave and Wheeler NWR to increase management for these bird species.

Strategies:

- Conduct surveys to determine the trends in grassland dependent bird species populations at Key Cave NWR, including a survey for Henslow's sparrow.
- Maintain unused farmland at Wheeler NWR in grassland/old field conditions, requiring periodic disturbance, until decisions are made on whether these lands will be permanently retired from the farming program.
- Conduct point counts or transects to survey grassland breeding birds on Key Cave NWR.
- Consider softer, feather edges (i.e., edges with various sized layers of vegetation, starting with large trees and ending in small grasses and forbs) around farm fields followed by native warm season grasses and forests at Wheeler and Key Cave NWRs.
- Develop small patches of native grasslands from retired unused farm fields at Wheeler NWR.
- Conduct prescribed burning operations at Wheeler and Key Cave NWRs.
- Continue conducting northern bobwhite covey call counts on Key Cave NWR.
- Continue the July 1-15 northern bobwhite, grasshopper sparrow, and dickcissel call count surveys at Key Cave NWR.
- Correlate survey data with habitat restoration activities to measure bird response to management practices at Key Cave NWR.

Objective 1.14. Scrub-shrub Landbirds – Within eight years of plan approval increase management efforts for scrub-shrub landbird species.

Discussion: Scrub-shrub species group have also been affected by loss of habitat. Opportunities exist at the Wheeler Complex to increase management for these bird species on Key Cave and Wheeler NWRs.

Strategies:

- Create softer, feather edges (i.e., edges with various sized layers of vegetation, starting with large trees and ending in small grasses and forbs) around farm fields at Wheeler and Key Cave NWRs.
- Conduct surveys and point counts to determine the trends in scrub-shrub bird species populations at Wheeler and Key Cave NWRs.

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- Maintain unused farmland at Wheeler NWR in various earlier successional conditions, requiring periodic disturbance.
 - Establish point counts and/or transects to monitor breeding and wintering bird use over time on early successional sites at Wheeler NWR.
 - Cut edges into existing forest to increase light or move edges into farm fields to increase perennial/annual/scrub-shrub cover at Key Cave and Wheeler NWRs.
 - Develop large tracts of old field habitat from retired unused farm fields at Wheeler NWR.
 - Conduct periodic prescribed burning operations at Wheeler and Key Cave NWRs.

Objective 1.15. Other Bird Management Issues – Over the 15-year life of the plan, address other special bird-related issues on Complex lands as needed to support Service goals.

Discussion: Specific bird management issues not considered in other categories or considered in other objectives will arise periodically. Examples of these issues include the 2006 discovery of nesting bald eagles on Wheeler NWR; the potential for natural establishment of double-crested cormorant nesting areas; the effects of mosquito control on birds; and the effects of communication towers on birds.

Strategies:

- Implement Southeast Regional Bald Eagle Management Guidelines, or the most recent update, on any Bald Eagle nest found on Complex lands.
- Monitor the reproduction of cormorants.
- Attempt to determine the affects of mosquito control on birds.
- Consider the impacts of communication towers on birds.

Objective 1.16. Game Species – Within eight years of plan approval, increase efforts at Wheeler NWR for conducting white-tailed deer health checks and population studies.

Discussion: Wheeler Complex supports a variety of habitats typical of the Tennessee River Valley and, consequently, hosts the full range of wildlife game species common to the area, such as white-tailed deer. Sound habitat management allows the Complex to maintain or increase population levels of game species. Population monitoring and a number of control measures can be implemented to provide recreational opportunities and maintain wildlife populations at or slightly below carrying capacity (the population level that can be sustained over the long term by the available habitat).

White-tailed deer are abundant on Wheeler NWR. Based on general observations and harvest data, deer numbers appear to be approaching carrying capacity. The deer population needs to continue to be monitored in conjunction with harvest so deer do not become overpopulated on the refuge. With no predators controlling deer population levels, hunting will continue to be a preferred method to control the deer population, while providing a compatible recreational hunting opportunity. Continued monitoring in conjunction with harvest is important to prevent overpopulation.

Overpopulation of deer can lead to the damage of seedlings, especially oaks, which can impede regeneration success in the bottomland hardwood areas of the refuge. Overgrazing can lead and contribute to changes in species composition, which, in turn, can result in negative effects on other plant and animal species (Cote et al., 2004). Damage to surrounding landowner property can also occur if deer populations rise above the carrying capacity. A firm understanding of population size and strong management decisions based on annual survey information prevents these negative effects, while sustaining a viable population to satisfy the needs of the public.

White-tailed deer are currently monitored at Wheeler NWR through data collected through herd health checks every five years by the Southeastern Cooperative Wildlife Disease Study (SCWDS), which is based in Athens, Georgia. State wildlife agencies from 15 southern states and the U.S. Geological Survey, Biological Resources Division, fund the SCWDS. The SCWDS is also supported by Veterinary Services of the Animal and Plant Health Inspection Service (APHIS), U.S. Department of Agriculture (USDA), for consultation and surveillance on a national and international basis where diseases may interact among wildlife, domestic livestock, and poultry. The last deer herd health check conducted at Wheeler NWR was in 2002.

Strategies:

- In conjunction with State partners, integrate key resident species population objectives into habitat management plans.
- Utilize hunting as a tool to manage wildlife populations when it is compatible with other refuge purposes and activities.
- Maintain a stable deer population through a program of either-sex hunting.
- Aim for removal of approximately one-third to one-half of the herd annually with a 1:1 harvest ratio of the sexes.
- Evaluate deer populations and adjust hunting programs as needed.
- Work with adjacent landowners to manage deer populations for the benefit of deer populations on and off of the refuge.
- Construct a self-service deer weigh-in and health check station to acquire more accurate data.
- In conjunction with State partners, analyze deer harvest data to monitor the health and density of the deer population at Wheeler NWR.
- Conduct herd health checks every 5-7 years and monitor habitat conditions to determine the health and population of deer at Wheeler NWR.

Objective 1.17. Amphibians and Reptiles – Within five years of plan approval increase management for improving populations of amphibians and reptiles on Complex lands.

Discussion: Amphibians and reptiles are an important component of the overall biological diversity of the Wheeler Complex and are declining worldwide. A variety of hypotheses for this decline have been suggested. Some possible reasons for declines in the vicinity of the Complex include predation by fire ants (especially ground dwelling and breeding species), loss of the ground layer (dead and down woody material), and contaminant impacts. Methods to monitor, survey, and inventory amphibians and reptiles must be addressed. In addition, ways to increase habitat for amphibians and reptiles must be evaluated.

Strategies:

- Prepare a Biological Inventory and Monitoring Plan by 2008, which includes inventorying, monitoring, habitat utilization, and standardized data collection procedures for amphibians and reptiles.
- Use a variety of methods to inventory amphibians and reptiles and determine population trends of selected species or species groups.
- Determine an effective method(s) for long-term monitoring of selected species or species groups so population trends can be determined. Include karst species and the American alligator.
- Prepare a Habitat Management Plan by 2008 for each refuge in the Complex, which identifies and protects essential habitat for amphibians and reptiles.

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- Manage specific forested areas on longer rotations to create habitat for species adapted to these areas.
 - Create and conserve downed woody material in refuge forests.
 - Review the National Partners in Amphibian and Reptile Conservation (PARC) Habitat Management Guidelines for Amphibian and Reptiles of the Southeastern United States and the proceedings of the Second Alabama Non-game Conference for species-of-concern and focus on refuge sites potentially harboring those species.
 - Assist with national efforts to monitor anurans via calling surveys.
 - Determine factors that may be influencing the amphibian and reptile population status on the Wheeler NWR (e.g., chemicals or habitat loss).
 - As needed, assist with abnormal amphibian and reptile studies.
 - Develop methods to monitor the effects of firewood cutting on amphibian and reptile populations.

Objective 1.18. Fisheries and Other Aquatic Species – Over the 15-year life of the plan, maintain and improve the management of fisheries resources at Wheeler NWR.

Discussion: Wheeler NWR has limited ability to manage the fishery resources in the Wheeler Reservoir and much work is already being accomplished by both Federal and State partners. Water levels are controlled by TVA, which limits management. Information from partners can be utilized to construct a species list and determine which further studies are needed. Opportunities for fish management are generally limited to population monitoring. There has not been a priority for the refuge to construct separate impoundments for fisheries management; however, a small pond for holding children's fishing events and similar public use activities was constructed in 1999 near the Visitor Center.

Strategies:

- Survey non-game fish in waters within Wheeler NWR and update the species list of all fish found within refuge waters.
- Update the 1984 Fishery Management Plan.
- Consider managing for year-round water in selected impoundments to improve the fishery resource in these areas.
- Improve ingress and egress of fish during management of water levels in selected refuge impoundments.
- When possible, improve protection measures for streams (increase the width of vegetative buffers along streams) and restore any degraded streams.
- Work with partners to create additional habitat for fish in areas such as Flint Creek and Limestone Bay.
- Cooperate with partners to participate in fish management studies.

Objective 1.19. State and/or Federal Endangered, Threatened, or Special Concern Species – Over the 15-year life of the plan, protect, inventory, monitor, and conserve imperiled terrestrial and aquatic species.

Discussion: The Wheeler Complex supports a variety of valuable habitats that are home to both Federal and State threatened, endangered, and species of special concern. The Complex should conserve these species and their habitats and, where possible, create the habitat they need per requirements of the Endangered Species Act as amended, pertinent Federal and State regulations, and Service policies.

Strategies:

- Contract with the Alabama Natural Heritage Program (ANHP) to survey and classify unique terrestrial and aquatic habitats on the Complex and the rare species that are present or may be present in these habitats.
- Determine ownership of subsurface waters in caves and the level of protection afforded by laws and regulations.
- Consider special designations at Wheeler NWR to create/simulate old growth forest, while carefully considering the designation criteria's constraints on management.
- In cooperation with partners, continue to inventory and monitor rare species found in karst habitats. Expand this effort to include invertebrates, such as a new species of cave shrimp being discovered in nearby caves.
- Search for Rafinesque's big-eared bat within appropriate habitat.
- Monitor the population of Price's potato-bean at Sauta Cave NWR.
- Monitor the population of American Harts-tongue fern at Fern Cave NWR.
- Consult with Ecological Services (ES) before any spraying occurs for control of West Nile virus vectors. If spraying occurs, attempt to determine if it has an adverse affect on listed bats.
- Assist the ADCNR when it surveys the area for Allegheny (New England) cottontail rabbits.
- Continue to partner with malacologists from the ADCNR, TVA, and the Service to monitor and conserve mussels and snails in the creeks, rivers, and streams.
- Work with partners to survey habitat on the north side of Wheeler NWR to determine presence/absence of the eastern hellbender to include habitat immediately north of the refuge.
- If hellbenders are located on Wheeler NWR, review the literature to determine ways to conserve and improve the habitat.
- If hellbenders are found north of Wheeler NWR, explore ways to conserve their habitat via private lands initiatives, conservation easements, and similar methods.
- Use existing private lands initiatives and explore new ones for riparian habitat protection and other efforts to protect creeks where listed or imperiled species are found.
- Apply for ecosystem flex funds to help conserve and protect areas such as Piney and Limestone Creeks.
- Explore other initiatives for protection of these lands, such as Forever Wild and land trusts.
- Work with NRCS to provide riparian buffers and restore riparian habitats through incentive programs, such as Conservation Reserve Program (CRP) and Wetlands Reserve Program (WRP).
- Support ADCNR and TVA's efforts to transplant Anthony's riversnail into Piney Creek, by using individuals from Limestone Creek.
- Support research to re-introduce the Rough pigtoe pearly mussel into its historic range.
- Develop educational materials about mussel species.
- Encourage establishment of protective water quality designations, stream buffer zones, and other habitat protection strategies.
- Determine threats, support research on measures needed to decrease these threats, and implement these measures where needed.
- Investigate habitat improvement needs and techniques to identify sites for habitat improvements for supporting Anthony's riversnail and the pink mucket (pearly mussel).

Objective 1.20, State and/or Federal Threatened, Endangered, or Special Concern Species – Over the 15-year life of the plan, contribute to the stabilization and/or increase of gray bat populations found within Key Cave.

Discussion: Key Cave is a priority one maternity cave for the endangered gray bat. Gray bat emergence counts are conducted annually and have averaged 33,400 gray bats since inception of the refuge in 1997. Approximately 12,000 to 13,000 young gray bats are produced annually by this maternity colony. It should be noted that TVA owns a portion of this cave, including the cave entrance.

Strategies:

- Expand the existing partnership with TVA to implement State and Federal recovery plans for the gray bat.
- Establish a partnership with ADCNR, TNC, and other partners to implement State and Federal recovery plans for the gray bat.
- Continue the annual monitoring program consisting of emergence and juvenile/maternity colony counts presently conducted by the ADCNR.
- Establish and implement a water quality monitoring program for Key Cave NWR.
- Ensure that a buffer of undisturbed vegetation is maintained around cave entrances.
- Protect wooded travel corridors between roosting and foraging sites.
- Prevent disturbance to important roost habitat (pertinent sub-tasks include prevent entry, install warning and information signs, conduct education activities, monitor roost sites to determine if management is effective, and conduct monitoring by law enforcement).
- If pesticide poisoning is suspected, periodically sample insects in foraging areas, guano in summer caves, and bats. Trace source of any pesticides discovered and take corrective action(s).

Objective 1.21. State and/or Federal Threatened, Endangered, or Special Concern Species – Within two years of plan implementation, develop a protection plan to increase conservation efforts for the Alabama cavefish found within Key Cave.

Discussion: Key Cave is the only known location of the Alabama cavefish, which inhabits the underground pools in Key Cave. Current efforts to monitor the cavefish are limited.

Strategies:

- Support research that would develop suitable survey methodology, possibly using remote sensing techniques, to conduct an Alabama cavefish survey.
- Continue to restrict access into the cave.
- Establish a water quality monitoring program for Key Cave NWR.
- Review results from the water sampling study that was initiated in 2001.
- In cooperation with partners such as TNC, NRCS, and the Lauderdale County Soil and Water Conservation District to protect the recharge area, including addressing options outside of the current acquisition boundary.
- Work with private landowners and other interested partners to establish buffers around sinkholes.

Objective 1.22. State and/or Federal Threatened, Endangered, or Special Concern Species – Over the 15-year life of the plan, contribute to the stabilization and/or increase of gray and Indiana bat populations found within Sauta Cave.

Discussion: Sauta Cave provides a summer roosting site for about 250,000-400,000 gray bats and a winter hibernaculum for both Indiana and gray bats. The site was a major maternity colony for gray bats, but recent evidence indicates that the colony may be mainly bachelor males. However, a new maternity site with about 4,000-5,000 young was discovered in 2003.

Strategies:

- Establish a partnership with the ADCNR, TNC, and other partners to implement State and Federal recovery plans for Indiana and gray bats.
- Establish and implement a water quality monitoring program for Sauta Cave NWR.
- Expand the search to other parts of the cave during monitoring of hibernating Indiana bats.
- Ensure that a buffer of undisturbed vegetation is maintained around cave entrances.
- Protect wooded travel corridors between roosting and foraging sites.
- Prevent disturbance to important roost habitat. Pertinent sub-tasks include prevent entry, install warning and information signs, conduct education activities, monitor roost sites to determine if management is effective, and conduct monitoring by law enforcement.
- Conserve water quality; conserve forest cover; perform research on effects of environmental disturbances, including that on prey species; and identify foraging areas for maternal caves.
- Monitor population trends. Census Priority 1 maternity colonies annually. If pesticide poisoning is suspected, periodically sample insects in foraging areas, guano in summer caves, and bats. Trace source of any pesticides discovered and take corrective action(s).

Objective 1.23. State and/or Federal Threatened, Endangered, or Special Concern Species – Within two years of plan implementation, develop a protection plan to increase the conservation of Price’s potato-bean at Sauta Cave NWR.

Discussion: The threatened Price’s potato-bean grows in forest openings in mixed hardwood stands where ravine slopes grade into creek or stream bottoms. Currently, Sauta Cave NWR has a very healthy population of the species; however, recovery efforts and conservation measures must continue.

Strategies:

- Conduct yearly surveys to monitor the status of Price’s potato-bean.
- Consult with Ecological Services (ES) regarding Price’s potato-bean management issues.
- Since this species tends to utilize open, disturbed habitats, support a series of forest thinning studies to evaluate the response of the species to different management techniques.
- Use GIS and GPS technologies to document and record the location of the population's boundary.
- Use remote sensing techniques to located potential sites for expanding the population.
- Develop an informational brochure to educate the public; have them available at the Wheeler Visitor Center.

Objective 1.24. State and/or Federal Threatened, Endangered, or Special Concern Species – Over the 15-year life of the plan, contribute to the stabilization and/or increase of gray and Indiana bat populations found within Fern Cave.

Discussion: Fern Cave contains the largest wintering colony of gray bats in the United States, with some estimates indicating over one million bats hibernating there. Bat experts also think that as many as one million Indiana bats may be using the cave. However, this hypothesis has not been proven.

Strategies:

- Establish a partnership with ADCNR, TNC, and other partners to implement State and Federal recovery plans for the gray bat.
- Monitor populations of bats once every five years.

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- Establish and implement a water quality monitoring program for Fern Cave NWR.
 - Use current Service policies and procedures to explore methods to ensure conservation of Surprise Pit, the fifth entrance to Fern Cave and Little Gnat Cave, which is about 1/4-mile from the Morgue entrance to Fern Cave. These methods might include conservation easements, agreements, technical assistance, and land acquisition.
 - Ensure that a buffer of undisturbed vegetation is maintained around cave entrances.
 - Maintain current Service policies and procedures for issuing special use permits for conducting research in the cave system.

Objective 1.25. State and/or Federal Threatened, Endangered, or Special Concern Species – Within two years of plan implementation, develop a protection plan to increase conservation of the American Hart’s-tongue fern at Fern Cave NWR.

Discussion: In the past, the threatened American Hart’s-tongue fern has been found on Fern Cave NWR. In fact, Fern Cave NWR gets its name from this rare plant. Two decades ago, 20 plants were documented on the refuge; however, the most recent survey was not able to find any plants. The disappearances of the plants are likely the result of unscrupulous plant collectors. The plant may still be present in the form of spores in the soil and may produce plants in future years. Past attempts to propagate this plant have failed.

Strategies:

- Support research on the propagation of the American Hart’s-tongue fern.
- Restrict access into the Morgue Pit.
- Consult Ecological Services (ES) regarding American Hart’s-tongue fern management issues.
- Conduct yearly surveys to monitor the status of the American Hart’s-tongue fern.
- Develop an informational brochure to educate the public; have them available at the Wheeler Visitor Center.
- Increase law enforcement (LE) patrols.
- Continue efforts to acquire lands within the approved acquisition boundary of Fern Cave NWR.

Objective 1.26. Exotic/Invasive/Nuisance Animals – Within 10 years of plan implementation, remove 65 percent of the invasive and nuisance animals from Wheeler Complex lands and waters.

Discussion: A basic tenant of the National Wildlife Refuge System Improvement Act is management for biological diversity and integrity. The Wheeler Complex has several documented native and non-native invasive/exotic/nuisance animal species and free-roaming domestic and feral animals. These species impact the Complex’s ability to carry out desired management objectives to varying degrees.

The Complex should be extremely concerned with the presence of feral hogs. Studies have shown that an adult feral hog will consume 160 pounds of hard mast, such as acorns, during a single winter (Yarrow 1987). In areas like Wheeler NWR, where the major habitat type is bottomland hardwoods and its associated hard mast production, feral hogs will be efficient competitors with native wildlife, including deer, turkey, quail, squirrels and waterfowl, for available hard mast resources. In addition to being a host of various diseases, such as swine brucellosis, feral hogs cause enormous structural damage to levees and roadways by rooting large holes while feeding on grasses, roots, and stems. The feral hog population on the Complex should be curtailed by any means possible; such control is both practical and attainable.

Strategies:

- Conduct a Complex-wide inventory that identifies problem species.
- Develop a detailed list of invasive/exotic/nuisance animals and prioritize for control efforts.
- Update the Pest Control Plan delineating authorized methods and personnel to control pests.
- Evaluate use of staff, public, or contractors in reducing populations.
- Utilize municipal animal control agencies and public education tools to combat free-roaming household pets.
- Reduce the feral hog population on Wheeler and Key Cave NWRs by allowing removal activities to be conducted by refuge staff, refuge volunteers, and/or under contract.
- Reduce the feral hog population on Wheeler NWR by expanding the current hunting program to allow feral hogs to be hunted during all established refuge hunting seasons.
- Increase efforts to control the population of resident Canada geese.
- Increase beaver control on Wheeler NWR by expanding the current contract with USDA-APHIS, Wildlife Services.
- Work with adjacent landowners at Wheeler NWR to participate in control efforts, especially for feral dogs and cats.
- Research and monitor nuisance animal response to control efforts.

HABITAT MANAGEMENT

Goal 2. Conduct Habitat Restoration and Management. Protect, maintain, enhance, and restore optimum habitat for the conservation and healthy management of migratory birds, resident wildlife, fish, and native plants, including all Federal and State threatened and endangered species found within northern Alabama in a manner that supports national and international treaties, plans, and initiatives.

Overview: Wheeler Complex has an active land management program that is designed to provide habitat for a diversity of wildlife. Land management activities are implemented to provide food, cover, and shelter for wildlife throughout the year. Most of Wheeler Complex's wildlife and habitat management programs are funded for supporting wintering waterfowl (impoundment and agricultural cropland management). However, the Complex is also involved with several other wildlife and habitat management programs. These programs include old field management; grassland management; forest management; and invasive, exotic, and nuisance plant species control.

Objective 2.1. Impoundments and Shallow Water Areas (SWAs) (including moist soil) – Over the 15-year life of the plan, continue efforts to improve and refine the management of impoundments and SWAs on Wheeler and Key Cave NWRs.

Discussion: Impoundments and shallow water areas (SWAs) are important habitats that provide food and resting areas for waterfowl and other wildlife. To be effective, excellent water level management is required. This task is accomplished two ways on Wheeler NWR. The first method is to leave water on an impoundment year-round to promote the growth of submerged aquatic vegetation. The second method is by conducting moist-soil management, which includes timely dewatering activities.

The refuge has several crucial impoundments that require dewatering to achieve moist-soil habitats. Water levels in these impoundments are operated in concert with the TVA. Continued operation and maintenance of such sites are crucial to successful waterfowl management. In addition, 16 acres of potential water impoundment habitat are currently located on Key Cave NWR. However, these SWAs do not currently hold water. Restoration efforts are needed to improve their water holding capacities.

Strategies:

- Conduct moist-soil plant composition surveys to assist in determining if or when moist-soil units should be disked. Normally, most moist-soil units will need to be shallow-disked every three to five years.
- Develop a rotational management scheme for soil disturbance activities to keep moist-soil areas in an early successional stage.
- Do not dewater moist-soil units at the same time.
- Stagger water removal throughout the late spring and summer.
- Precede mowing by conducting plant composition surveys.
- Place water level gauges in all impoundments to correlate water levels with management practices and plant responses.
- Record all manipulation activities by date for each unit.
- Record all activities in water impoundments.
- Ensure continued operation of pumps at the White Springs and Rockhouse Impoundments via TVA cooperative agreements and ensure budget priority for annual operation and maintenance of the pumps and associated facilities.
- Initiate intensive water control and record water depth conditions at time of drawdown and at least twice/month during growth in spring/summer.
- In late summer or early fall, sample moist-soil impoundment plant communities to determine, at a minimum, the percent of poor, fair, and good waterfowl foods available in each impoundment.
- Prepare a Water Management Plan for each impoundment.
- Explore the use of bentonite clay to seal the underlying soil for the shallow water areas at Key Cave NWR to improve their water holding capacities.
- Continue efforts to control alligator weed.
- Retain some beaver ponds in sites where they will not detract from other management or damage adjacent property.

Objective 2.2. Agricultural Cropland – Over the 15-year life of the plan, utilize a well-managed farming program to provide food, cover, and resting areas for waterfowl and other wildlife on Wheeler and Key Cave NWRs.

Discussion: Farming is an integral part of the Complex's habitat management program, providing food, browse, cover, and resting areas for waterfowl and other wildlife. Cooperative farming has been used for more than 50 years to meet these goals. Currently, Wheeler and Key Cave NWRs have active cooperative farming programs with seven farmers at Wheeler and one at Key Cave participating for the primary purpose of providing food and other needed habitats for waterfowl and other wildlife. Crops, such as corn, milo, millet, and wheat (green browse), supplement natural foods. Corn is the preferred crop chosen for Complex shares, although millet is planted in areas too wet for corn production.

Currently, the Complex share is 18 percent of the corn and soybean crop. The Complex does not take soybeans as shares, so the soybean acreage is converted to corn shares. The Complex share for winter wheat is currently 20 percent. Over the last five years, an average of about 4,000 acres has been planted annually, including some acreage by force account (using Complex staff and equipment). Force account farming has been limited to the planting of winter wheat in harvested corn fields for green browse and planting of millet.

As Canada geese populations have declined from an average of 35,000 in the late 1980s to current averages below 5,000, the need for a large farming program at Wheeler NWR has somewhat diminished. The recognized needs of neotropical migratory birds necessitate the evaluation of converting some of the cropland to wooded habitat. It has been estimated that 300 acres of corn, 300 acres of wheat, and 2,500 acres of moist soil is required to meet the needs of a maximum of 34,200 geese and cranes and 53,000 ducks. This estimate should be re-evaluated every five years.

The use of cooperative farming requires approximately five times the above corn acreage (1,500 acres) to provide 18 percent to the refuge and 82 percent to the farmer. To allow for crop rotation, the cooperative farming program requires twice the corn acreage (3,000 acres). However, more corn and corn acreage may be required to fulfill these goals as the refuge refines acreages available for production of good moist-soil plants. Additional farming acreage will be needed in wet years when millet has to be planted instead of corn, since millet supports fewer ducks.

To provide for years when more millet needs to be planted, and if more hot foods must be planted due to lack of good moist-soil acreage, few croplands can be converted to other habitat types. Therefore, it has been recommended by the Biological Review Team that contract farming be investigated as a long-term (five or more years) solution. Less cropland would be needed, since 100 percent would be left as food instead of 18 percent using cooperative farming. The major constraint for this approach would be the cost. The refuge would also have to plant 300 acres of green browse. The advantages would be less chemical use, reduced row-cropping, increased acres converted to other types of habitat, and improved soil conservation and water quality.

Another option would be to plant these 300 acres of corn and 300 acres of green browse with the Complex staff or seasonal employees (i.e., by force account). Under this option, the Complex would be required to purchase or rent planting, cultivating and, spraying equipment; purchase all seed, fertilizer, chemicals, and lime; and assure that employees were trained and available to carry out these duties. Under the contract farming and force account options, it would still require about 800 acres under ideal conditions, which is if all the needs of waterfowl and cranes could be met through corn planting.

Strategies:

- Continue current cooperative farming program until such time as an alternative farming strategy is adopted, including the availability of appropriate resources. Modify the current program as needed.
- Review acreage needed to provide for the annual hot food, primarily corn, and green browse needs of waterfowl and cranes and their proper placement on Wheeler NWR.
- Identify highest priority fields to achieve waterfowl and crane management goals.
- Initiate a process to convert any excess farm fields to alternate habitat types and/or reduce farmed acreage by creating soft edges.
- Secure equipment, training, and other resources to carry out the farming operation.

Objective 2.3. Old Field/Shrubland Habitat – Over the 15-year life of the plan increase management of old field and shrubland habitats at Wheeler NWR.

Discussion: There is an increasing need for more stable acreage and a dependable supply of early-successional habitat in the Interior Low Plateau. Although there is an increase in scrub-shrub habitat on surrounding private lands, these areas are increasingly less suitable for early-successional species. The dense stocking of plantings, the increased use of pesticides, and the lack of burning all lead to lower quality scrub-shrub habitat.

Old fields and shrublands are valuable habitats for wildlife, particularly important for ground-nesting birds and for a variety of songbirds. The loss of these habitats through conversion to other land uses, predominantly into residential development or through succession is resulting in the decline and disappearance of some wildlife species that are dependent on early successional habitats. Old field and shrubland communities provide vegetative structure and diversity vital to nesting, brood rearing, feeding, and providing escape cover for early-successional wildlife.

These habitats are typically comprised of many kinds of plants, which furnish key habitat components for a variety of wildlife species. Wildlife use of an old field and shrubland habitats are directly related to the kinds of plants in the field. As succession advances from one plant stage to another, the animal community also changes. The primary management objective is to maintain the field in plant stages that will provide the basic daily and seasonal cover requirements for the desired wildlife. The key to restoring and maintaining an old field habitat type is periodic disturbance of the vegetation to alter plant succession. Disturbances causing vegetative changes can be triggered by natural causes, such as fire, wind, and flooding, or artificially by activities, such as cultivating, mowing, cutting, or using herbicides. Planned disturbances at the proper time during succession can enhance old field and shrubland habitat for wildlife. Unused farmland on the Wheeler NWR could be managed as old field habitat subject to regular disturbances on a 10- to 15-year cycle. The Rockhouse area and land surrounding the Visitor Center provide opportunities for scrub-shrub management.

Strategies:

- Evaluate areas on Wheeler NWR to be managed as old field or shrubland habitats.
- Either cut the edge back into the existing forest to increase light or move the edge into farm fields to increase perennial/annual/scrub-shrub cover.
- Consider softer, feather edges (edges with various sized layers of vegetation, starting with large trees and ending in small grasses and forbs) around farm fields and forests to benefit these species.
- For sites determined to be maintained in an early successional condition, establish a series of point counts and/or transects to monitor breeding and wintering bird use over time.
- On retired agriculture fields, allow natural succession to occur for three to five years, while controlling invasive plants, and then determine which of these sites should be set back, allowed to succeed into forest, or planted in preferred forest species.

Objective 2.4. Grassland Management – Within six years of plan implementation, promote the establishment of native warm season grassland (NWSG) habitats for the conservation of migratory birds and a natural diversity of wildlife at Wheeler and Key Cave NWRs.

Discussion: Wheeler and Key Cave NWRs are connected to adjacent Tennessee counties designated under the Central Hardwoods Bird Conservation Partnership as grassland focus areas. There is an increasing need for more stable acreage and a dependable supply of grassland habitat. Unused farmland on Wheeler NWR could be managed as grassland habitat subject to regular disturbances.

Since Key Cave NWR was purchased by the Service in 1997, Complex management has dedicated time, funds, equipment, and labor to restore a large portion of the refuge to native warm season grasses (NWSG). Each year, the Complex staff converts additional acreages of farmland and erosion ditches into grasslands. This effort not only helps protect the fragile Key Cave aquifer from harmful contaminants, but it also provides valuable habitat for a variety of migratory bird species. These efforts help support regional habitat goals.

Strategies:

- Increase native warm season grassland (NWSG) management at Key Cave NWR by controlling encroaching vegetation.
- Evaluate areas on Wheeler NWR to plant additional NWSGs.
- Develop a management regime for size and timing of prescribed burns in native grasslands (four to five years for Henslow's sparrows and two to three years for other target species, such as dickcissels, grasshopper sparrows, northern bobwhite, and others).
- Consider haying, disking, and grazing as another form of grassland management.
- Train Wheeler NWR staff in prescribed burning and utilize partners when needed.
- If available, obtain and use local NWSG seed.

Objective 2.5. Forest Management – Over the 15-year life of the plan, manage forested habitats for priority species and use adaptive management on all Complex lands.

Discussion: The following management schemes were recommended by the Biological Review Team: various forests that are in a mature hardwood condition should remain basically unchanged to promote old-growth conditions; selected bottomland stands should be managed to promote the regeneration of oaks with a relatively open canopy (60-80 percent closure), large trees, and a native understory with many layers; upland stands managed for hardwoods and thinned more aggressively than bottomlands to promote large trees with a complex understory; and off-site pine converted to hardwoods.

Forestry and prescribed burning have the potential to mold the forest and other areas into preferred habitats for wildlife. Depending on the type of management, forestry can benefit species that prefer various types of forests, different successional stages, different stocking levels, and many other forest variables. It should be noted that prescribed burning is difficult to use at Wheeler NWR due to smoke management concerns (e.g., due to the proximity of the cities of Decatur and Huntsville, many roads, and Huntsville International Airport).

Strategies:

- Update existing forest management plans.
- Choose specific forested areas to promote old-growth.
- Establish an organized, safe, and well-documented prescribed burning program.
- Promote large trees, promote oaks, and retain snags.
- Promote switchcane and other native understory plants.
- Thin more aggressively to promote the growth of the understory to create a multi-layered effect.
- Use firewood permits as a thinning tool.
- Create forested buffers to improve, protect, and restore streams.
- Survey selected plants, fish, and wildlife in forested areas pre- and post-management to monitor the effectiveness of forest management and change.
- Convert an existing 75-acre oak woodlot at Key Cave NWR to oak savanna habitat by an initial thinning to 40 square-foot basal area, from below, followed by a series of prescribed burns. Plant the open areas in native grasses to aid in savanna establishment. Consider future thinning to 20 square-foot basal area.
- Evaluate other areas on Key Cave NWR for possible conversion to oak savanna habitat.
- Maintain shagbark hickory and other loose bark trees.

Objective 2.6. Invasive/Exotic Plant Species Management – Within five years of plan implementation, eliminate at a minimum 25 percent of the non-native invasive or exotic plant species from Complex lands.

Discussion: A basic tenant of the National Wildlife Refuge System Improvement Act is management for biological diversity and integrity. Wheeler Complex has several documented native and non-native invasive and/or exotic plant species. These species impact the Complex's ability to carry out desired management objectives to varying degrees. Staff must determine the priority and degree of control in combating these species.

Strategies:

- Conduct an inventory and identify problem species.
- Develop documentation and mapping systems by using GPS and GIS.
- Develop a list identifying and ranking the priority species for control.
- Evaluate the options of biological, mechanical, and chemical control.
- Implement control techniques, monitor results, and re-evaluate.
- Seek partners in the federal government, state government, private sector, and academia, and utilize volunteers, whenever possible, to identify, locate, and remove invasive and/or exotic plant species.
- Control the spread of native invasive plant species.
- Increase efforts to educate the public about invasive plant species.

RESOURCE PROTECTION

Goal 3. Provide Resource Conservation and Protection. Provide coordination and cooperation among organizations to enhance effective management and protection of natural and cultural resources within northern Alabama.

Overview: Resource protection means safeguarding the integrity of the various resources present on refuges, including wildlife, habitat, and cultural resources. Resource protection includes ensuring that any use of Refuge lands is compatible with the purposes of those sites and the Service's mission; reducing the illegal take and overuse/exploitation of biological and cultural resources; and minimizing or eliminating adverse effects on trust species, their habitats, and Service lands by working with other regulatory and land management agencies, developers, and other resource users. Work to integrate the Service's ecosystem approach with that of other agencies and organizations, as well as with their planning activities, and increase cooperation and coordination within the Service. This also includes protecting resources and improving habitats off-refuge through the Service's Partners for Fish and Wildlife Program.

Objective 3.1. Law Enforcement – Over the 15-year life of the plan, maintain and improve a highly trained and effective law enforcement (LE) program to ensure resource protection, visitor safety, and that visitors adhere to all Complex related acts and regulations.

Discussion: Protecting the natural resources of the Wheeler Complex and ensuring the safety of all refuge visitors are fundamental responsibilities of the Refuge System. The Wheeler Complex is currently accomplishing this increasing responsibility with only two full-time LE officers. As crime continues to increase in America, the Wheeler Complex faces a larger and more complicated enforcement problem. Additional full-time officers are needed to fulfill the LE requirements of Wheeler Complex.

Strategies:

- Hire an additional LE officer.
- Provide up-to-date training and equipment, including support for K-9 activities.
- Continue to cooperate with State, county and local law enforcement agencies by developing partnerships to share LE responsibilities on Key Cave, Sauta Cave, and Fern Cave NWRs.
- Continue to provide LE education and outreach programs to local citizens.
- Provide assistance to Service special agents and State conservation activities within existing policy, as requested.
- Continue to develop and implement LE procedures for protecting cultural resources and for diminishing site destruction due to looting and vandalism.
- Ensure that by 2010, all LE officers have completed the Archaeological Resources Protection Act training course.
- Provide specialized communication and surveillance equipment.

Objective 3.2 (Cultural Resources) – Over the 15-year life of the plan, continue to identify and protect cultural resources on the Wheeler Complex in accordance with Federal and State historic preservation laws and regulations.

Discussion: With the enactment of the Antiquities Act of 1906, the Federal Government recognized the importance of cultural resources to the national identity and sought to protect archaeological sites and historic structures on those lands owned, managed, or controlled by the United States. Cultural resources include archaeological resources, historic and architectural properties, and areas or sites of traditional or religious significance to Native Americans (Service Manual 614 FW 1, Policy, Responsibilities, and Definitions).

The body of historic preservation laws has grown dramatically since 1906. Several themes recur in the laws and the promulgating regulations. They include: 1) each agency is to systematically inventory the historic properties on their holdings and to scientifically assess each property's eligibility for the National Register of Historic Places; 2) Federal agencies are to consider the impacts to cultural resources during the agencies' management activities and seek to avoid or mitigate adverse impacts; 3) the protection of cultural resources from looting and vandalism are 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 and African American communities, to address how a project or management activity may impact specific archaeological sites and landscapes deemed important to those groups.

Strategies:

- Comply with Section 106 of the National Historic Preservation Act, the Archaeological Resources Protection Act of 1979, and any other pertinent historic preservation mandates prior to the initiation of any undertaking or habitat management action.
- Draft a cultural resources overview of each refuge in the Complex using existing information, such as the regional and State Site File Databases and technical reports describing past archaeological, historical, and geomorphic investigations.
- By 2011, complete an archaeological survey for the Complex using a comprehensive scientific approach.
- The Regional Archaeologist, in consultation with the State Historic Preservation Office, will evaluate the National Register eligibility of those buildings and/or structures found on Wheeler Complex that are older than 50 years.

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- Develop and implement LE procedures to protect cultural resources and to diminish site destruction due to looting and vandalism.
 - Facilitate partnerships to aid in the management of cultural resources with the pertinent Federal and State agencies, the State Historic Preservation Office, professional archaeologists, Native American communities, and the general public.
 - Develop and implement an educational program that will provide an understanding and appreciation of the Complex's ecology and the human influence on the Lower Tennessee-Cumberland Ecosystem.
 - Develop and implement a plan to protect identified sites in consultation and cooperation with federally recognized Native American tribes, the Alabama State Historic Preservation Officer, and the professional archaeological community.
 - In consultation with the Regional Archaeologist, integrate cultural resources management and protection strategies into refuge management plans.
 - Catalog refuge artifacts and historic documents and assure appropriate archival.
 - Develop a GIS layer for the archaeological and historic sites of the Complex that will mesh with existing layers for habitat type, vegetative cover, hydrology, and soils.
 - Ensure that by 2010, all LE officers have completed the Archaeological Resources Protection Act training course.

Objective 3.3 (Private Land Assistance Program) – Over the 15-year life of the plan, provide technical assistance, and where appropriate, use private lands conservation programs to assist private landowners in managing lands for biological diversity with emphasis on trust resources and watersheds adjacent to refuges within the Wheeler Complex.

Discussion: Many national wildlife refuges have implemented private lands programs to address broader ecosystem and landscape issues, both problems and opportunities (such as wetlands restoration and conservation corridors). Service authorities for involvement with private landowners in developing and carrying out habitat improvement projects are found in the Improvement Act and in the policy documents for the Service's Partners for Fish and Wildlife (PFW) Program. Additional authorities reside within the Fish and Wildlife Act and the Fish and Wildlife Coordination Act. Under the PFW Program, landowners may receive up to \$25,000 for on-the-ground project implementation. PFW projects typically receive a minimum 50 percent in-kind cost share and require a minimum 10-year commitment from the landowner.

The Farm Bill conservation programs, available through the USDA under successive Farm Bills, provide opportunities for the development and implementation of habitat improvement projects on private lands. These programs include the Wetland Reserve Program (WRP), the Conservation Reserve Program (CRP), the Wildlife Habitat Incentives Program (WHIP), the Grassland Reserve Program (GRP), and the Environmental Quality Incentives Program (EQIP). Many millions of dollars are available to eligible private landowners for habitat conservation under these programs.

Wheeler NWR initiated a private lands program in 1997 to support efforts of the Lower Tennessee-Cumberland Ecosystem's Strategic Plan and Migratory Bird Plan. In doing so, the Wheeler NWR private lands program has initiated projects to establish native warm season grass habitats on private land. The refuge has also worked cooperatively with partners (NRCS, County Soil and Water Conservation Districts, TNC, private landowners, and other interested parties) to protect and restore selected watersheds, with emphasis on those containing threatened and endangered species. Furthermore, it has worked with the USDA's State Technical Committee to place greater emphasis (i.e., attain a higher ranking) on its wildlife habitat programs that have direct benefits to wildlife using Wheeler Complex and to help eradicate or control invasive species.

Strategies:

- Continue to work with and support other organizations in efforts to promote wildlife conservation on private lands.
- Continue to work with and support other organizations in efforts to eliminate invasive and/or exotic plant and animal species on private lands.
- Seek other sources of support for conservation on private lands in northern Alabama.
- Work with local USDA offices and State technical committees to acquire support for higher ranking of projects related to refuges within the Wheeler Complex.
- Review ranking criteria for private lands projects in an attempt to place more emphasis on migratory bird projects, particularly projects that help Wheeler Complex achieve stated goals.
- Continue working under a Memorandum of Understanding (MOU) with the Alabama Mountains, Rivers, and Valleys Resource Conservation, and Development Council to make the Truax No-till Native Grass Seed Drill available to private landowners for planting native grasses.
- Continue to develop and implement cooperative agreements with the Limestone County Soil and Water Conservation District for riparian protection in the Piney and Limestone Creeks watersheds to benefit the endangered Anthony's riversnail, the slender campeloma, and the armored snail.
- Continue to develop and implement cooperative agreements with the Lauderdale County Soil and Water Conservation District in the Cypress Creek watershed for riparian protection to benefit the threatened slackwater darter and for establishment of sinkhole buffers in the Key Cave watershed to protect the endangered Alabama cavefish and gray bats.

Objective 3.4 (Cooperation with Partners) – Over the 15-year life of the plan, maintain and enhance existing partnerships and seek new partnerships to improve conservation of natural resources on and off Complex lands.

Discussion: In recent years, the Service has encouraged national wildlife refuges to increase their cooperation with partners. This includes State and Federal agencies, nonprofit organizations, volunteers, universities, colleges, the public, adjacent landowners, and others. Through partnerships, the refuge harnesses not only the manpower of these groups, but also their knowledge, wisdom, and enthusiasm. This activity leverages resources to conserve the natural resources on Complex lands and elsewhere. Wheeler Complex currently works with many partners. Existing partnerships can always be improved and other partnerships initiated.

Strategies:

- Continue to develop and implement cooperative agreements with local soil and water conservation districts to develop private land projects.
- Continue work with the Wildlife Habitat Council and local industries, creating wildlife habitat and corridors on corporate lands and other conservation projects.
- Approach the ADCNR regarding assistance with aerial waterfowl surveys.
- Seek the assistance of TNC, Alabama Forestry Commission, and others for prescribed burning at Key Cave NWR.
- Partner with the city of Decatur, city of Huntsville, Redstone Arsenal, and others to develop and enhance the GIS capabilities of the Wheeler Complex.
- Work with Redstone Arsenal on conservation issues, such as migratory bird surveys, invasive and/or exotic plant and animal species control, and forest management.
- Work with the Central Hardwoods Bird Conservation Region (CHBCR) in managing migratory birds and their habitat on the Wheeler Complex.

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- Communicate key issues with off-site audiences by attending local civic organization meetings.
 - Develop partnerships with universities, junior colleges, and other research based organizations to conduct wildlife and habitat studies on Complex lands.

Objective 3.5 (Land Acquisition) – Over the 15-year life of the plan, continue efforts to pursue the acquisition of lands within the approved acquisition boundary at Fern Cave NWR.

Discussion: All of the lands within the approved acquisition boundary for Fern Cave NWR have not been obtained by the Service. In fact, 476 acres within the approved acquisition boundary remain in private ownership. If funds and willing sellers become available, the Complex will attempt to acquire these lands in accordance with current Service policy.

Strategies:

- Continue to acquire the remaining 476 acres of land within the current refuge acquisition boundary, with special emphasis on those areas that would (1) protect Fern Cave and its habitat; (2) contribute to national and regional objectives; (3) reduce impacts to refuge resources; and/or (4) provide access.

Objective 3.6 (Land Protection) – Over the 15-year life of the plan, explore methods to protect land by developing conservation focus areas.

Discussion: Several land protection/conservation areas were identified in the Alabama Comprehensive Wildlife Conservation Strategy (CWCS) (Figures 16 and 17). In order to help meet these objectives, methods to conserve specific areas should be explored by the Service.

Strategies:

- Work with the partners to establish sufficient interests to protect a buffer of land along Piney and Limestone Creeks near Wheeler NWR to help conserve the listed snails in these streams.
- Work with the partners to secure sufficient interests in additional lands necessary to maintain or develop forested blocks to provide areas of about 5,000 acres with a minimum of 70 percent forest cover near Wheeler NWR.
- Work with the partners to establish sufficient interests to protect a buffer of land surrounding the high hazard recharge zone for the Key Cave aquifer.

Objective 3.7 (Minimize Effects of Urbanization) – Within three years of plan approval, increase efforts to protect Complex resources and minimize impacts from urbanization to include rights-of-way, encroachment, and littering.

Discussion: Wheeler Complex has serious challenges confronting it, many related to the urban environment in which it is located. The cities of Decatur, Huntsville, Madison, Florence, and Scottsboro continue to increase in population. Commercial, industrial, and residential development continues to destroy and degrade farmland and natural areas at an alarming rate. Although many portions of the Wheeler and Key Cave NWRs are still surrounded by large agricultural tracts, these are likely to decline over the next five to 10 years.

Strategies:

- Support a study analyzing the impacts of existing rights-of-way easements on refuge resources. Results would be used to determine if current refuge policy should be altered.
- Work with local city, county, and State planning departments to minimize encroachment onto refuge boundaries.
- Establish refuge-wide habitat surveys to determine baseline conditions and longer-term habitat community changes to evaluate short- and long-term refuge treatments and management strategies; and to assess changes in habitats/urban sprawl within a 10-15 mile radius of each refuge in the Complex.

Objective 3.8 (Water Quality and Quantity Management) – Within five years of plan implementation, develop and implement a water quantity and water quality monitoring program to ensure that the Wheeler Complex maintains adequate and environmentally safe water supplies to meet the needs of plants, fish, and wildlife, including the natural processes that support these resources (e.g., water levels in ground and surface that support hydric soils).

Discussion: Activities impacting both water quality and quantity are appearing with increasing frequency. Water quality is a major human and wildlife concern because of the number of people in the area that depend on drinking water from the Tennessee River or its tributaries and the number of fish and wildlife species that are directly dependent on high water quality. In the late 1980s and early 1990s, the Tennessee River was considered one of the ten most polluted rivers in the country. Its status was related to point source pollution from industries and non-point source pollution from residential development and agricultural practices.

Refuges in the western United States have dealt with water issues for a number of years, including the amount of water refuges are allotted. Water quantity issues are now developing in the eastern United States. Locally, large water irrigation systems are increasing in number each year. In addition, ground and surface waters are being used for a number of purposes, such as drinking water. As the human population increases, competition for water will become an extremely important issue.

Strategies:

- Ensure the Wheeler Complex has input into the TVA's Reservoir Operations Study.
- Work with partners to ensure that Wheeler NWR receives adequate water supplies.
- Work with the USGS to install and monitor water gauging stations.
- Establish a working relationship with local city and county planning agencies to ensure that the Wheeler Complex staff is involved in decisions regarding water quantity and quality issues.
- Develop and implement a water quality sampling program.
- Hire an additional staff member in conjunction with Ecological Services (ES) to address the various water quality, contaminant, and similar issues in northern Alabama, including the refuges in the Wheeler Complex.
- Review reports, environmental risk assessments, and other documents about these issues and comment as needed.
- Develop a regional water quality sampling scheme and contaminants monitoring plan to address impacts to the Wheeler Complex and other natural resources.
- Continue and expand DDT monitoring efforts on Redstone Arsenal and downstream areas impacted by this contaminant.
- Continue working with the EPA technical committee to address the DDT issue.

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- Work with the solicitor to determine appropriate actions related to DDT contamination of the refuge by Olin Corporation.
 - Explore funding opportunities to continue DDT monitoring (e.g., flex funding and Superfund).
 - Work with other agencies and individuals to accomplish this work.
 - Work closely with Redstone Arsenal, NASA, and other entities that are using or that have used their facilities to reduce/mitigate the effects of their activities on Wheeler NWR and natural resources on private lands.
 - Participate on teams reviewing contaminants on and moving away from their facilities.
 - Review and provide comments on all contamination assessment documentation.
 - Determine if the Army; NASA; and/or other entities, such as Olin Corporation, have the responsibility to fund Service contaminant assessment and cleanup/mitigation efforts related to contaminants produced by these entities.
 - Explore using buffer/border zones along surface waters on refuge properties to reduce the impact of sedimentation and pesticide runoff.
 - Assess, characterize, and monitor the toxicity of on- and off-site agricultural activities.
 - Work with the Alabama Cooperative Extension Service to develop an Integrated Pest Management (IPM) plan for the Complex and identify alternatives to more toxic pesticides and pesticide use in general.
 - Ensure that cooperative farmers use Best Management Practices (BMPs) to conserve soil loss and reduce pesticide use.
 - Determine if infield drains are a direct conduit into the recharge area of Key Cave and, if so, reduce/mitigate any impacts of these on this refuge.
 - Continue and expand water quality monitoring on all refuges, especially in karst habitats.
 - Continue and expand monitoring of bats for contaminants.
 - Be proactive in addressing the developing issue of West Nile Virus vector control via pesticides or other contaminants.
 - Develop a comprehensive Complex-wide litter control and reduction program.

Objective 3.9 (Clean Air Management) – Over the 15-year life of the plan, work with partners to ensure that air quality standards are maintained.

Discussion: The U.S. Environmental Protection Agency (EPA) was consulted for information on air quality in the vicinity of the Wheeler Complex. Currently, the only National Ambient Air Quality Standard exceeded in this area (in Madison and Morgan Counties) is the eight-hour ozone concentration– by 0.01 parts per million. According to the web site, this standard was blocked from implementation by a 1999 Federal court ruling. Thus, technically, there are no air quality standards violations in any of these counties. The Complex has little ability to control air quality in this area.

Strategies:

- Obtain air quality information from agencies that are monitoring this resource to determine if it meets standards.
- With the help of agencies that sample air quality (NASA, Redstone Arsenal, TVA, and EPA), monitor the status of air quality around refuges in the Wheeler Complex.
- Work closely with TVA air quality sampling staff.
- Establish a partnership with the Air Division of the Alabama Department of Environmental Management (ADEM).
- Coordinate fire management activities with ADEM and the Alabama Forestry Commission in order to minimize the potential air quality impacts that prescribed burning may cause.

VISITOR SERVICES

Goal 4: Provide Education and Visitor Services. Visitors, students, wildlife-dependent recreationists, and nearby residents enjoy, appreciate, and support Wheeler Complex and its management practices.

Overview: The National Wildlife Refuge System Administration Act, as amended by the National Wildlife Refuge System Improvement Act of 1997, states that compatible wildlife-dependent recreational uses are the priority public uses of the National Wildlife Refuge System (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) and will receive enhanced consideration over other general public uses. Volunteers, partners, recreation fees, and concessions are tools available to assist in managing these uses. The Service will only permit other uses when it is determined that they are appropriate and compatible and 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. (Service Manual 605 FW 1, General Guidance, and 603 FW 1, Appropriate Refuge Uses).

Approximately 650,000 people visit Wheeler NWR annually, engaging in hunting, fishing, wildlife observation, photography, and environmental education and interpretation. Wheeler NWR is fortunate to have a 10,000-square foot Visitor Center that provides environmental educational outreach programs and land stewardship education programs for both youth and adults. Public use is currently light at Key Cave, Sauta Cave, and Fern Cave NWRs; however, Complex administration anticipates an increase in public use at both Key Cave and Sauta Cave NWRs over the next 15 years.

Objective 4.1 (Provide Quality Hunting Opportunities) – Over the 15-year life of the plan, provide safe, quality hunting opportunities of species, such as white-tailed deer, feral hog, squirrel, rabbit, raccoon, opossum, morning dove, and northern bobwhite, consistent with sound biological principals, in support of the Complex's wildlife management objectives, and in accordance with Refuge System policy and State and Federal laws.

Discussion: Managing wildlife populations and their habitats is the primary responsibility of the Complex and a required component of the Refuge System's wildlife first mission. If managed appropriately, hunting provides a biologically sound form of outdoor recreation that is used throughout the Refuge System to help manage wildlife populations. Hunting is one of the priority public use activities recognized by the Improvement Act of 1997 when it is compatible with the purposes for which the refuge was established (see Service Manual 605 FW 2, Hunting).

Wheeler NWR has a well-established hunting program that has been in place for more than 50 years. Through these years the hunting program has gone through constant change and annual reviews and adjustments. This practice will continue. The current program consists of only resident game hunts in which hunting is permitted on approximately 18,000 acres and hunting regulations are published each year in the hunting permit. White-tailed deer, feral hog, squirrel, rabbit, raccoon, opossum, and northern bobwhite are hunted within the State's hunting season framework. General hunting is governed by Section 50 of the Code of Federal Regulations and refuge-specific regulations are spelled out in the Wheeler NWR Hunting Regulations Brochure.

Small game hunting provides quality recreation for many people and is allowed on Wheeler NWR. In the future, squirrel season will be extended by a few days to ensure that two consecutive weekends are included. This action is a direct result of comments obtained during the public scoping process.

White-tailed deer hunting on Wheeler NWR is essential for maintaining a healthy deer herd and preventing overpopulation levels that, in turn, can negatively impact habitat. Because Wheeler NWR was established for migratory birds, deer populations must be controlled to prevent adverse impacts to migratory bird habitats. Not only do deer eat the understory in forested areas, they also consume large quantities of agricultural crops planted as high-calorie foods for wintering waterfowl. In addition, overabundant populations of deer can inflict major economic losses in the transportation industry and contribute to the transmission of several animal and human diseases (Cote et al., 2004). The primary focus of deer management on Wheeler NWR is to maintain a healthy population and is not to produce trophy animals.

In 2005, feral hogs were added to the hunting permit for Wheeler NWR in an effort to help control this exotic, invasive species and to limit habitat destruction and negative impacts to native wildlife. Feral hogs can cause extensive habitat damage and the Service suspects that they also negatively impact wildlife by direct mortality and through competition for food, in fact feral hogs are viewed as serious threats to ground nesting gamebirds (e.g., bobwhites) (Tolleson et al., 1993). They also can cause economic damage through vehicle collisions and through destruction of landscaped areas and road shoulders by rooting. On Wheeler NWR, feral hogs are currently allowed to be taken during the white-tailed deer season. However, as a result of comments during public scoping, the feral hog season will be expanded throughout all of the established hunting seasons on the refuge.

Hunting is allowed on approximately 1,060 acres at Key Cave NWR through a permitting program in conjunction with the State's Seven Mile Island Wildlife Management Area. Squirrel, rabbit, raccoon, opossum, mourning dove, and northern bobwhite are hunted within the State's hunting season framework.

The refuge hunt season runs concurrently with the State hunting season and hunting for the above species is allowed on Monday, Tuesday, Friday, and Saturday. Hunting opportunities would be increased over the next three to five years with a greater emphasis would be placed on the quality of the experience with more diverse opportunities, including those for youth and disabled hunters.

Hunting is currently allowed on approximately 264 acres at Sauta Cave NWR through a permitting program in conjunction with the State's North Sauty Wildlife Management Area. No changes are planned for the hunting program at Sauta Cave NWR.

Hunting is not currently allowed at Fern Cave NWR. Access is extremely difficult and public access is through private land or from the Paint Rock River. As a result, law enforcement is limited and access is not available to the general public. In addition, Fern Cave NWR is only 199 acres in size. In the future, if more land becomes available and/or public access is improved, the Service will give consideration in providing limited hunting opportunities at Fern Cave NWR.

Strategies:

- Continue current hunting program with minor annual modifications to include the hunting of feral hogs during all established hunting seasons at Wheeler NWR and the extension of the squirrel season at Wheeler NWR to include two consecutive weekends.
- Prohibit hunting in areas designated as high-priority habitat for waterfowl to reduce human disturbance to ducks, geese, and cranes.
- Evaluate the hunting program to assure it is consistent with State seasons and regulations.
- Assure adequate signage and law enforcement (LE) presence utilizing Service and/or State LE officers.

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- Review 50 CFR special regulations and annual hunt brochure to assure proper codification and information is documented.
 - Conduct a deer herd health check on Wheeler NWR every five years.
 - Provide safe, quality hunting opportunities for persons with disabilities by improving access for hunters with special handicapped equipment and/or needs.
 - Encourage youth to enjoy hunting, fishing, wildlife observation, and other wildlife-dependent recreational activities.
 - Develop a hunting program section in the step-down Visitor Services Plan.
 - Evaluate Tally-Ho fox hunting as an appropriate use.

Objective 4.2 (Provide Quality Fishing Opportunities) – Over the 15-year life of the plan, conduct a safe, quality fishing program in accordance with Refuge System policy, and State and Federal laws.

Discussion: Fishing is an appropriate use of wildlife resources on units of the Refuge System, when compatible (Service Manual 605 FW 3, Fishing).

Fishing is a major recreational activity at Wheeler NWR, accounting for approximately 40 percent of total visitation (or over 250,000 annual visitors). The refuge provides approximately 11,250 surface acres of fishable waters when the Wheeler Reservoir is at full-lake level. Method of take, daily creel limits, possession limits, and size limits are conducted in accordance with State regulations. Special refuge regulations apply to posted areas.

Both bank fishing and boat fishing opportunities abound on Wheeler NWR and facilities developed in support of the fishing program are excellent. There are six improved boat launching facilities and many primitive launch sites, as well as numerous places to launch canoes, kayaks, and small boats. Littering is an ongoing major problem at each of these areas, as well as others on the refuge.

Special fishing events are held at the handicapped-accessible fishing pond and its associated pavilion. The pond is closed to all public access and use except during special programs and has become an integral part of the refuge's Special Events program.

Fishing opportunities do not exist at either Key Cave or Sauta Cave NWRs.

Fishing is only available along the eastern bank of the Paint Rock River at Fern Cave NWR. State rules and regulations apply.

Strategies:

- Continue the current fishing program at Wheeler NWR with annual evaluation and needed modifications.
- Evaluate the fishing program to assure it is consistent with State seasons and regulations.
- Assure adequate signage and law enforcement presence by utilizing Service and/or State officers.
- Conduct at least two youth fishing rodeos at Wheeler NWR each year.
- Develop a fishing program section in the step-down Visitor Services Plan.
- Eliminate night bank fishing in most areas except improved boat ramps and designated night bank fishing areas to reduce illegal activities and minimize disturbance to wildlife. A valid night fishing permit will be required.
- Extend the boat access restriction on Crabtree Slough to March 1st to minimize human disturbance to waterfowl.

Objective 4.3 (Provide Quality Wildlife Observation and Photography Opportunities) – Over the 15-year life of the plan, conduct a safe, quality wildlife observation and photography program in accordance with Refuge System policy and State and Federal laws.

Discussion: Wildlife observation and wildlife photography are appropriate wildlife-dependent recreational uses of Refuge System lands, when compatible. Visitors of all ages and abilities have the opportunity to observe and photograph wildlife and habitat resources on the Wheeler Complex (Service Manual 605 FW 4 Wildlife Observation and FW 5, Wildlife Photography).

Wheeler NWR provides many opportunities for observing and/or photographing wildlife. Whether one is visiting the Wildlife Observation Building, walking on one of the refuge's five nature trails, walking on many of the dirt/gravel roads, driving on open roads, or visiting the Beaverdam Peninsula Wildlife Observation Tower, ample opportunities may present themselves at any time to view a wide variety of species. A photography blind near the Wildlife Observation Building pond provides photography enthusiasts opportunities to capture incredible wildlife photographs.

At Key Cave NWR, public use is steadily increasing. The refuge has 2.5 miles of roads and trails that are now open for nature walking and bicycling that passes through native grasslands, upland hardwoods, and agricultural land. The nature trail system offers opportunities to view or photograph an assortment of wildlife, including many grassland bird species.

At Sauta Cave NWR, watching bats emerge at dusk from Sauta Cave is a very popular activity. It is not uncommon to see 250,000 gray bats exit from Sauta Cave. At dusk, bats leave the cave to begin their nightly foraging. This event can last for up to an hour. The refuge offers a viewing platform in which visitors can safely view the bat emergence. The platform is located near the lower entrance to the cave.

Due to its difficult terrain, wildlife observation and photography opportunities are limited at Fern Cave NWR.

Strategies:

- Develop a wildlife observation and photography program section in the step-down Visitor Services Plan for the Complex.
- Continue current wildlife observation and wildlife photography program with annual evaluation and needed modifications.
- Construct an additional wildlife observation tower and photography blind on the north side of the river at Wheeler NWR.
- Add interpretive panels along Flint Creek Nature Trail and develop a loop trail to connect to the existing Dancy Bottom Nature Trail at Wheeler NWR.
- Develop a bat viewing platform and replace signs at Cave Springs Cave at Wheeler NWR.
- Boardwalk the Wildlife Observation Building Trail at Wheeler NWR.
- Place directional signs at decision points along Atkeson Nature Trail and Flint Creek Nature Trail at Wheeler NWR.
- Develop a wildlife drive (auto tour) at Wheeler NWR.
- Develop new brochures for Key Cave, Sauta Cave, and Fern Cave NWRs.

Objective 4.4 (Provide a Quality Environmental Education Program) – Over the 15-year life of the plan, continue to conduct a safe, quality environmental education program in accordance with Refuge System policy and State and Federal laws and tied to national and State education standards.

Discussion: The Wheeler Complex currently conducts formal, curriculum-based environmental education programs that are tied to national and State education standards through the use of facilities, equipment, educational materials, teacher workshops, and study sites that are safe and conducive to learning. These programs help advance public awareness, understanding, appreciation, and knowledge of key fish, wildlife, plant, and resource issues (Service Manual 605 FW 6, Environmental Education).

Environmental education is a focal point of the public use program at Wheeler NWR. Approximately 20,000 people annually attend either on-site or off-site programs provided by refuge staff or refuge volunteers. The Visitor Information Center and Wildlife Observation Building serve as the hub for public use activities and host approximately 75,000 visitors annually. In addition, area schools conduct numerous environmental education activities at the Visitor Center annually, normally hosting over 2,000 school children. A live red-tailed hawk and several species of snakes are kept at the Visitor Center for educational programs. Three park rangers and several volunteers conduct the environmental education programs.

Current programs include:

- Refuge Summer Day Camps – 10 one-day long camps for ages 8-13 that teach students environmental education using hands-on learning.
- Annual Wet-n-Wild Festival – a three-day event hosted by the refuge each October for approximately 1,800 local 5th graders.
- ACES Program - a partnership with the Decatur Police Department that brings 250 local inner-city youths to the refuge during the summer months for one-half day of fishing and environmental education programs.
- FAWN (Forestry Awareness Week Now) - all Decatur City and Morgan County schools 6th grade classes come to the refuge for a day of outdoor, environmental educational programs.
- EARTHSCOPE - an environmental education program conducted by the Huntsville City School System brings 2,000+ students to Wheeler NWR annually.
- Junior Duck Stamp - a program that encourages students to design a duck stamp encouraging education about waterfowl and wetland conservation.
- Several youth fishing events are held on the special use pond near the Visitor Center, including some handicapped accessible fishing group events.

Strategies:

- Continue the current environmental education programs with annual evaluation and needed modifications.
- Improve on community-based environmental education programs in coordination with area schools and other educational organizations. Place emphasis on developing programs for local schools near Key Cave, Sauta Cave, and Fern Cave NWRs.
- Explore ways to increase participation in the Junior Duck Stamp contest to include web-site development.
- Develop an environmental education program section in the step-down Visitor Services Plan for the Complex.

Objective 4.5 (Wildlife Interpretation) – Within seven years of plan approval, at least 75 percent of visitors will have a better understanding of the Complex's contribution to the protection and restoration of the Tennessee River Valley.

Discussion: Through formal, curriculum-based environmental education tied to national and State education standards, the Wheeler Complex communicates the most important fish, wildlife, habitat, and other resource issues to visitors of all ages and abilities through effective interpretation. Through heightened awareness, visitors are inspired to take positive actions supporting refuge goals and the Refuge System mission (Service Manual 605 FW 7, Interpretation).

The primary interpretive theme of Wheeler NWR focuses on the awareness and importance of waterfowl and migratory birds and their conservation. Trails, boardwalks, parking areas, signs, and informative kiosks provide managed access to and provide valuable information about the Complex. Informative displays are designed to provide visitors with clear information so they can easily determine where they can go, what they can do, and how to safely and ethically engage in recreational and educational activities.

Strategies:

- Continue current interpretation program with annual evaluation and needed modifications.
- Develop interpretive kiosk displays and interpretive signs at various locations throughout the Complex that will provide information about the Service and the Refuge System to include areas at Key Cave and Sauta Cave NWRs.
- Provide tree identification brochure for use at Flint Creek Nature Trail.
- Install new informative wildlife education displays at the Visitor Center.
- Provide interpretation regarding bats and karst/cave ecosystems during some summer weekend evenings at Sauta Cave NWR.
- Explore possibility of taped guided tours for the proposed wildlife drive (auto tour).
- Develop an interpretation program section in the step-down Visitor Services Plan for the Complex.

Objective 4.6 (Public Use Limitations) – Within three years of plan implementation, critically review public use activities that may lead to wildlife disturbance or habitat degradation and initiate changes as needed to enhance resource protection and reduce illegal activities.

Discussion: All public use activities on the Wheeler Complex must be evaluated periodically to ensure wildlife resources and habitats are not being compromised. The listed strategies were designed to limit or slightly modify some public use programs in order to increase resource protection and reduce illegal activities. A high priority will be placed on protecting areas of high duck, goose, and crane use to minimize disturbance from human activities.

Strategies:

- Close Wheeler NWR to public entry between sunset and sunrise except for (1) access to developed boat launching facilities, (2) access to designated bank fishing areas, (3) any night hunting as provided in the hunting permit, and (4) activities covered under a special use permit.
- Through media outreach, educate the public in reference to the new hours for Wheeler NWR.
- Require night hunters to carry a night hunting permit and be actively engaged in hunting.
- Publish new regulations in 50 CFR.
- Prohibit boat entry into Crabtree slough at Wheeler NWR from November 15th through March 1st. This action would extend the current closure policy by adding and additional fifteen days.

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- Maintain the current policy for horseback riding at Wheeler NWR. The current policy for horse and mule riding is as follows: Horse and mules are permitted on open graveled roads only. They are not permitted on refuge hunts.
 - Evaluate Tally Ho fox hunts on Wheeler NWR for appropriate use.
 - Continue to prohibit all-terrain vehicles (ATVs) on all Complex lands except by permit in established handicapped hunting area.
 - Develop a public access and limitation program section in the step-down Visitor Services Plan for the Complex.
 - Require night bank anglers to carry a night fishing permit and be actively engaged in fishing.

Objective 4.7 (Visitor Services Plan) – Within three years of plan implementation, develop a Wheeler Complex Visitor Services Plan.

Discussion: A Visitor Services Plan will set goals, determine measurable objectives, identify strategies, and establish evaluation criteria for all visitor services, stepping down the direction and guidance outlined in the CCP. Careful planning provides the visiting public with opportunities to enjoy and appreciate fish, wildlife, plants, and other resources.

Strategies:

- Review and update the Wheeler NWR Visitor Services Plan.
- Develop Visitor Services Plans for Key Cave, Sauta Cave, and Fern Cave NWRs.
- Merge all Visitor Services Plans into one overall Visitor Services Plan for the Complex.

Objective 4.8 (Volunteer Program) – Over the 15-year life of the plan, continue to build a highly visible and dynamic volunteer and intern workforce for the Wheeler Complex and improve on the highly successful Wheeler Wildlife Refuge Association (WWRA).

Discussion: Volunteers and refuge support (friends) groups fortify refuge staffs with their gifts of time, skills, and energy and are integral to the future of the Refuge System. Refuge staff will initiate and nurture relationships with volunteers and refuge support groups, and will continually support, monitor, and evaluate these groups with the goal of fortifying important refuge activities.

The National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act of 1998 (P.L. 105-242) strengthens the Refuge System's role in developing effective partnerships with various community groups. Whether through volunteers, refuge support groups, or other important partnerships in the community, refuge personnel will seek to make the refuge an integral part of the community, giving rise to a stronger Refuge System.

In 1998, Wheeler NWR staff worked with a local newspaper specifically to recruit volunteers to expand the volunteer program. Since that time, the program has grown from four to five active volunteers to approximately fifty volunteers. Duties include staffing the Visitor Center; conducting on- and off-site environmental education programs, trail maintenance, litter removal, bluebird trail management, and wildlife surveys; and assisting with special events.

A training program is in place for all volunteers to ensure the volunteer understands his/her role and responsibilities, as well as refuge regulations. Orientation tours are provided for new volunteers and updates are provided on an as-needed basis. Field trips and an appreciation dinner are held annually for all refuge volunteers. The Supervisory Park Ranger serves as the volunteer coordinator for all volunteers, except those who work strictly on biological projects who are supervised by the Refuge Biologist.

The Wheeler Wildlife Refuge Association (WWRA) was officially formed in 1998 through the signing of a Memorandum of Agreement with the Service. The purpose of WWRA is “to promote conservation, awareness, and appreciation of the Wheeler National Wildlife Refuge and to provide assistance to refuge environmental education programs and other conservation efforts on the refuge.” The group provides a voice for the refuge in the community and has greatly assisted with controversial issues that have had the potential to negatively impact refuge lands.

Strategies:

- Continue the current volunteer program with annual evaluations and needed modifications.
- Purchase a vehicle that would be dedicated for use by volunteers, thus enhancing efforts of volunteers.
- Develop a section on the Wheeler Complex website to provide information about the volunteer program.
- Work with the Wheeler Wildlife Refuge Association (WWRA) subcommittees and/or members to handle all responsibilities (e.g., handling the financial matters, producing the newsletter, and stocking bookstore). These responsibilities should not be conducted by refuge staff.
- Continue efforts to attend national and regional friends group meetings.
- Assign a staff person who has at least ½ of his/her job dedicated to being the Volunteer Coordinator.
- Develop an additional camper pad and expand the volunteer camper program at Wheeler NWR.
- Develop volunteer-led interpretive programs for peak times (e.g., roving interpreters and off-site presentations).
- Develop a volunteer program section in the step-down Visitor Services Plan for the Complex.

REFUGE ADMINISTRATION

Goal 5. Provide Refuge Administration. Provide administrative support and guidance to ensure that the goals and objectives for fish and wildlife populations, habitats, resource protection and conservation, and visitor services are achieved for the Wheeler Complex.

Overview: The administrative functions associated with the Wheeler Complex include a wide range of activities that are critical to the mission of the Refuge System and the purpose(s) of each refuge. These functions include staffing, training, budgeting, planning, law enforcement, facility management, computerized databases, road infrastructure, community relations, partnering, and equipment maintenance. To carry out these functions, a national wildlife refuge complex must have the appropriate level of staffing.

Objective 5.1 (Personnel) – Within the 15-year life of the CCP, obtain additional staff (19 full-time employees) and the resources needed to accomplish all of the outlined comprehensive conservation management goals and objectives.

Discussion: Currently, the Wheeler Complex has fifteen full-time employees and one term employee. One maintenance position is currently vacant, but funds have not been allocated to fill the position. To implement this CCP and accomplish the vision, goals, and objectives identified for this Complex, additional resources will be needed. Staff positions for the Wheeler Complex will need to be increased by 19 full-time positions, with priority focused on resource protection, resource conservation, habitat management, and environmental education and interpretation.

Strategies:

- Provide continuing education and training opportunities to all Complex staff members to include computer-based systems.
- Focus Complex staff training activities on improved recordkeeping, adaptive management procedures, standardized data storage, and archiving.
- Hire an assistant manager and a tractor operator for Key Cave NWR.
- Hire a biologist and a biological science technician for Sauta Cave NWR.
- Hire a biologist and a biological science technician for Fern Cave NWR.
- Hire one additional law enforcement (LE) officer, one maintenance leader, one facilities manager, one additional wildlife biologist, two additional biological science technicians, one GIS specialist, and one contaminants specialist for the Complex.
- Hire two additional park rangers, one education specialist, one additional maintenance worker, and one education coordinator to increase the capabilities of the environmental education and interpretation program.
- By 2010, ensure that pertinent Complex staff members have taken the Overview for Cultural Resources Management Requirements Course (WLD 2117).

Objective 5.2 (Facilities and Equipment) – Over the 15-year life of the plan, provide adequate and functional offices, maintenance facilities, and equipment to support existing and future expansions of Complex programs.

Discussion: Adequate office space, updated residential housing, modern maintenance facilities, and updated office equipment are essential components needed to maintain an efficient and well-organized Complex staff.

Strategies:

- Replace the current headquarters administration building with a new modern administrative building.
- Replace Residence #2 at Wheeler NWR.
- Provide modern office equipment and supplies to include updated computer hardware / software, high-speed Internet access, digital cameras, GPS, and video projectors.
- Provide safe, efficient, and modern maintenance equipment, facilities, and vehicles to carry out Complex operations.
- Dedicate operational funds to purchase high resolution aerial imagery to type map vegetation and classify habitats on the Complex.
- Dedicate operational funds for performing all biological work to include: basic wildlife and habitat inventorying and monitoring on Complex lands, with an emphasis on standardized scientific protocol procedures; data recording; data storage; data analysis; and data retrieval procedures.
- Update and maintain the Wheeler Complex website.
- Complete the necessary requirements to enable the Traveler Information System at Wheeler NWR to be fully operational.
- Provide operational funds to update the Traveler Information System at least one per quarter to ensure that the public is kept abreast of current events.
- Develop GIS products and/or capabilities to spatially show and document locations and trends of such conditions as: invasive plant habitat locations/trends; moist-soil impoundment locations; farmed fields and acreage; forest canopy; boundary locations, and urban encroachment.

Chapter V. Plan Implementation

INTRODUCTION

Refuge lands are managed as defined under the National Wildlife Refuge System Improvement Act of 1997. Congress has distinguished a clear legislative mission of wildlife conservation for all national wildlife refuges. National wildlife refuges, unlike other public lands, are dedicated to the conservation of the Nation's fish and wildlife resources and not wholly dedicated to compatible wildlife-dependent recreational uses. Priority projects emphasize the protection and enhancement of fish and wildlife species first and foremost, but considerable emphasis is placed on balancing the needs and demands for appropriate and compatible wildlife-dependent recreation and environmental education.

To accomplish the purposes, vision, goals, and objectives for the refuges contained in this plan for Wheeler National Wildlife Refuge Complex, this section identifies projects, funding and personnel needs, volunteers, partnerships opportunities, step-down management plans, a monitoring and adaptive management plan, and plan review and revision.

PROPOSED PROJECTS

Listed below are the proposed project summaries and their estimated associated costs for fish and wildlife population management, habitat management, resource protection, visitor services, and refuge administration over the 15-year life of the CCP. This proposed project list reflects the priority needs identified by the public, the CCP planning team, and core Complex staff based upon available information.

These projects were generated for the purpose of serving the purposes of the refuges and achieving the goals, objectives, and strategies for each refuge in the Wheeler Complex and are organized by goal and project categories. The Refuge Operations Needs System (RONS) and/or Service Asset and Maintenance Management System (SAMMS) project number is included for those projects already defined in RONS, which is a Service system of identifying and prioritizing new projects, or in SAMMS, which is a Service system of identifying and prioritizing maintenance projects.

The primary linkages of these projects to those planning elements are identified in each summary of the project category. A complete listing of each proposed project, its ranking of priority within the Complex, its associated costs, and recurring costs can be found in Appendix J.

FISH AND WILDLIFE POPULATION MANAGEMENT

Project Category 1: Increase Control of Invasive, Exotic and Nuisance Animal Species

Controlling invasive, exotic and/or nuisance animal species is a top priority of the Wheeler Complex. Some of the more problematic species, such as beaver and feral hogs, have caused extensive damage to important wildlife habitats and to other wildlife species. If they are not controlled, beavers and feral hogs will continue to destroy habitat at a rapid pace. This project category contains two projects (1A and 1B). Each project is designed to supplement current management practices already underway or currently funded. (Linkages: Objective 1.2; Objectives 2.1, 2.2, and 2.4; and Objective 4.1.)

Project 1A: Beaver Management – RONS #97007 Wheeler NWR

Beavers are seriously impacting water control infrastructure, hampering dewatering operations, and killing hundreds of acres of forested wetlands on Wheeler NWR. In addition, privately owned forested areas adjacent to the refuge are being impacted. Project 1A would provide funding for developing an intensive contract beaver management program. A contract beaver trapper would trap and remove nuisance beaver from water management areas and adjacent forested wetlands. The estimated first-year cost for this project is \$25,000, with a recurring cost of \$10,000.

Project 1B: Control Feral Hogs – New Project for Wheeler and Key Cave NWRs

Feral hogs on Wheeler and Key Cave NWRs are compromising efforts in wetland restoration, reforestation, and habitat management. Currently, management is using a multi-faceted control program, including public hunting, staff control, trapping, and various other techniques. Project 1B would provide the necessary funds to contract professional animal damage control personnel to supplement the Complex staff's feral swine control efforts. The estimated first-year cost of this project is \$30,000, with a recurring cost of \$15,000.

Project Category 2: Increase Inventory, Surveys, and Monitoring of Plant and Animal Populations

Inventories, surveys, and monitoring of plant and animal populations are needed to ensure the biological integrity of Complex lands is maintained. This information is critical for developing habitat management plans that will influence all other management activities. This project category contains three projects (2A, 2B, and 2C), which include two additional staff members. (Linkages: Objectives 1.1, 1.3, and 1.5 -1.18)

Project 2A: Conduct Needed Monitoring of Wildlife Populations on Wheeler Complex by Establishing an Additional Wildlife Biologist Position – RONS #000006 Wheeler NWR

Inventories, surveys, and monitoring of wildlife populations are critical pieces of information needed to develop and update wildlife management plans. Project 2A provides funds for the hiring of a Wildlife Biologist to monitor and survey fish, wildlife, and plant populations on the Wheeler Complex. Currently, population levels and basic biological information are lacking on most species. Limited surveys of migratory birds do occur; however, this project will expand and increase these efforts. In addition, a comprehensive wildlife survey plan would be developed and initiated. The estimated first-year cost for this project is \$140,000, with a recurring cost of \$75,000.

Project 2B: Classification of Natural Plant Communities and Inventory of Vascular Flora – RONS #02001 Wheeler NWR

Inventories and classification of plant communities and vascular flora are critical pieces of information needed to develop comprehensive habitat management plans. Project 2B provides funds for conducting a detailed systematic inventory and classification of plant species on approximately 16,500 acres at Wheeler NWR, which have not been conducted. Results would contribute to the baseline knowledge of natural resources on Wheeler NWR and provide a framework to evaluate impacts of habitat management strategies on the other refuges in the Complex. The estimated first-year cost for this project is \$40,000, with a recurring cost of \$4,000.

Project 2C: Manage American Woodcock by Establishing an Additional Biological Science Technician Position – RONS #97002 Wheeler NWR

Project 2C would provide funds for the hiring of a Biological Science Technician to monitor migratory bird activities and to conduct an American woodcock management study on Wheeler NWR. Information of the extent of use and quality of nesting and wintering American woodcock habitat on the refuge is lacking. Information on woodcock use and nesting on the refuge would be determined by this project and the information would be used to develop forest management priorities to enhance 13,000 acres of potential woodcock habitat. Woodcock nesting densities would be calculated and correlated with singing ground surveys to determine annual nesting trends. This study could have region-wide woodcock management applications. The estimated first-year cost for this project is \$118,000, with a recurring cost of \$53,000.

Project Category 3: Increase Management Activities for the Conservation of Threatened and Endangered Species

Wheeler Complex is home to a wide array of threatened and endangered species. In fact, Key Cave, Sauta Cave, and Fern Cave NWR were established to conserve and protect threatened and endangered species. These refuges are currently un-staffed and are managed at a distance by Wheeler NWR. Basic fundamental biological information is lacking about these species and additional staff at each refuge would greatly enhance conservation and protection efforts. This project category is comprised of six projects (3A, 3B, 3C, 3D, 3E, and 3F), which include the addition of five new staff members. (Linkages: Objectives 1.18-25; 2.2, 2.4-6; and 3.3-4)

Project 3A: Manage Endangered Wildlife and Habitats by Establishing a New Assistant Manager Position at Key Cave NWR – RONS #97010 Key Cave NWR

Project 3A would provide funds for the hiring of an Assistant Manager at Key Cave NWR to direct habitat restoration and management operations, conducting soil conservation efforts, serving as a liaison with local landowners for resource protection, and providing visitor safety. Key Cave NWR is critical to the conservation and continued existence of the Alabama cavefish, serving as the primary recharge area for the only known population of this highly endangered fish. In addition to the cavefish, Key Cave is home to approximately 40,000 endangered gray bats. All management at Key Cave NWR is currently conducted by Wheeler NWR, which is an already understaffed refuge located more than an hour away from Key Cave NWR. The estimated first-year cost for this project is \$154,000, with a recurring cost of \$75,000.

Project 3B: Manage Endangered Bats and other Rare Wildlife by Establishing a New Biologist Position at Sauta Cave NWR – RONS #000001 Sauta Cave NWR

Project 3B would provide funds for the hiring of a Wildlife Biologist at Sauta Cave NWR to help ensure the conservation, protection, and recovery of federally listed endangered gray and Indiana bats. Sauta Cave serves as a summer roost and small maternity/bachelor cave for 250,000 – 400,000 gray bats and an important hibernating location for several hundred Indiana bats. In addition to the endangered bats, the threatened Price's potato-bean is found on Sauta Cave NWR. This satellite refuge has never been staffed and basic biological information needed to manage these species is lacking. A Wildlife Biologist is needed to conduct research and other studies to recommend and direct proper management decisions to ensure the conservation of these rare species and their habitats. The estimated first-year cost for this project is \$140,000, with a recurring cost of \$75,000.

Project 3C: Monitor Endangered Bats and other Rare Wildlife by Establishing a New Biological Science Technician Position at Sauta Cave NWR – RONS #000002 Sauta Cave NWR

Project 3C would provide funds for the hiring of a Biological Science Technician at Sauta Cave NWR to help ensure the conservation, protection, and recovery of federally listed species. A Biological Science Technician is needed to assist in basic surveys, monitoring, and research to provide data for proper management decisions and to ensure the conservation of these rare species and their habitats. The estimated first-year cost for this project is \$128,000, with a recurring cost of \$63,000.

Project 3D: Manage Endangered Bats and other Rare Wildlife by Establishing a New Biologist Position at Fern Cave NWR – RONS #000001 Fern Cave NWR

Project 3D would provide funds for the hiring of a Wildlife Biologist at Fern Cave NWR to help ensure the conservation, protection, and recovery of federally listed endangered gray bats and the threatened American Hart's-tongue fern. Fern Cave NWR contains the only population of American Hart's-tongue fern on public land and is the single most important gray bat "hibernaculum" in North America, hosting more than one million hibernating gray bats. This satellite refuge has never been staffed and basic biological information needed to manage these species is lacking. A Wildlife Biologist is needed to conduct research and other studies to recommend and direct proper management decisions to ensure the conservation of these rare species and their habitats. The estimated first-year cost for this project is \$140,000, with a recurring cost of \$75,000.

Project 3E: Monitor Endangered Bats and other Rare Wildlife by Establishing a New Biological Science Technician Position at Fern Cave NWR – RONS #000002 Fern Cave NWR

Project 3E would provide funds for the hiring of a Biological Science Technician at Fern Cave NWR to help ensure the conservation, protection, and recovery of federally listed species. A Biological Science Technician is needed to assist in basic surveys, monitoring, and research to provide data for proper management decisions and to ensure the conservation of these rare species and their habitats. The estimated first-year cost for this project is \$128,000, with a recurring cost of \$63,000.

Project 3F: Conduct a Forest Management Study at Sauta Cave NWR to Evaluate Price's Potato-Bean Response to Various Forest Thinning Techniques – New Project for Sauta Cave NWR

Project 3F would provide the necessary funding to conduct a series of forest research experiments at Sauta Cave NWR. These experiments would be designed to evaluate Price's potato-bean response to various forest thinning techniques. Results would indicate if a change in forest management should be initiated at Sauta Cave NWR. The estimated first-year cost of this project is \$70,000, with a recurring cost of \$10,000.

HABITAT MANAGEMENT

Project Category 4: Improve Water Management System Operations

A system of levees, water control structures, and mechanical pumps are necessary to provide dependable flooded habitats that correspond with the migration chronologies of migratory birds. Effective water management is critical in flooded habitats to meet the needs of migratory birds, to stimulate the production of desirable moist-soil plants, and to control undesirable plants. This project category is comprised of seven projects (4A, 4B, 4C, 4D, 4E, 4F, and 4G) that are designed to improve the operation of the water management system at Wheeler NWR. (Linkages: Objectives 1.4-9 and 2.1-2 and 2.7)

Project 4A: Construct Two Pump Stations in the White Springs Dewatering Unit to Provide an Effective Water Supply – RONS #96002 Wheeler NWR

Project 4A would provide funding for the installation of two pumping stations in the White Springs Dewatering Unit to provide water for effective, less costly habitat management for a large percentage of Wheeler NWR's migratory bird population. The 3,000-acre White Springs Unit has few water supply capabilities short of costly contract pumping or unpredictable/uncontrollable rainfall. The ability to provide or remove water when needed is essential to provide quality habitat. Completion of this project would enhance the production of both natural waterfowl foods and planted grain crops, resulting in increased use of the unit by birds and other wildlife. The estimated first-year cost of this project is \$835,000, with a recurring cost of \$60,000.

Project 4B: Install Three Water Control Structures in the White Springs Dewatering Unit to Enable Effective Water Movement – RONS #96003 Wheeler NWR

The White Springs Unit has few water control capabilities, short of costly contract pumping. The ability to manage water levels effectively is essential to providing quality habitat for migratory water birds. Project 4B would provide funding to install three water control structures, facilitating more rapid gravity flow drawdown in early spring. Project completion would result in substantial savings in pumping costs and also permit more timely water control, thus improving management for migratory birds. The estimated first-year cost of this project is \$319,000, with a recurring cost of \$25,000.

Project 4C: Construct Two Pump Stations in the Rockhouse Dewatering Unit – RONS #02002 Wheeler NWR

Project 4C would provide funding for the construction of two pumping stations in the Rockhouse Dewatering Unit. The Rockhouse Unit is heavily used by migratory waterfowl. Under optimum conditions, it can provide habitat for approximately 30,000 waterfowl. Management of the unit is presently limited due to an inability to efficiently move water through the unit. Construction of two pumping stations would allow optimum management of water levels in the 1,500-acre unit, while enhancing production of both natural waterfowl foods and planted grain crops, resulting in increased use by waterfowl. The estimated first-year cost of this project is \$800,000, with a recurring cost of \$40,000.

Project 4D: White Springs #4 Water Control Structures – RONS #97008 Wheeler NWR

Project 4D would provide funding for the construction of a low head dike and installation of a water control structure in White Springs #4 Unit, dividing the impoundment into two units and allowing greater flexibility in management and increased water level control. Management options for migratory birds would be increased by allowing units to be operated independently. The estimated first-year cost of this project is \$100,000, with a recurring cost of \$15,000.

Project 4E: Rehabilitate Inefficient White Springs Water Distribution System – SAMMS #00103414 Wheeler NWR

The White Spring Dewatering Unit at Wheeler NWR is heavily used by migratory birds. Extensive siltation has occurred in the dewatering unit and in areas adjacent to existing water control structures. Water levels can no longer be effectively managed. Project 4E would provide funding to clean out 12 miles of water distribution canals to include the removal and disposal of associated vegetation and debris. The estimated first-year cost of this project is \$176,000, with a recurring cost of \$10,000.

*Project 4F: Replace Defective Crabtree Slough Water Control Structure – SAMMS #01113573
Wheeler NWR*

Crabtree Slough provides important habitat for migratory waterfowl, wading birds, and other migratory and resident birds. Water levels are controlled by a concrete stoplog structure constructed in 1953. The structure is aging and becoming less efficient in controlling water levels. Project 4G would provide funding to replace this water control structure. The estimated first-year cost of this project is \$72,000, with a recurring cost of \$2,000.

*Project 4G: Replace Blackwell Swamp Main Water Control Structure – SAMMS #01113576
Wheeler NWR*

Blackwell Swamp provides important habitat for migratory waterfowl, wading birds, and many other fish and wildlife species. Water levels are controlled by an outdated double screwgate aluminum and concrete structure. Corrosion of the aluminum pipe structure is decreasing the water level control efficiency of the structure. Project 4H would provide funding to replace this water control structure. The estimated first-year cost of this project is \$125,000, with a recurring cost of \$4,000.

Project Category 5: Increase Control of Invasive and Undesirable Plant Species

The biological integrity of Complex lands is threatened by a variety of invasive and undesirable plant species. The majority of these problematic species are aquatic; however, some terrestrial species also occur throughout the Complex. The ability to control invasive plants is crucial in meeting objectives of local, state, and national conservation plans. This project category is comprised of two projects (5A and 5B). (Linkages: Objective 2.7 and Objectives 3.3-4, and 3.7)

Project 5A: Dewatering Unit Vegetation Control. – RONS #96001 Wheeler NWR

Many of the impoundments on *Wheeler* NWR are infested with invasive plant species. Project 5A would provide funding for invasive vegetation control in these areas through mechanical mowing and discing. In addition, it would fund maintenance of these units, thus providing optimum conditions for moist-soil management. The estimated first-year cost is \$75,000, with a recurring cost of \$30,000 per year.

Project 5B: Develop an Invasive Plant Species Program to Control Invasive Plants on Wheeler Complex – New Project for Wheeler Complex

Project 5B would provide funding to implement a Complex-wide program to control invasive, exotic, and undesirable plants that would target both aquatic and terrestrial invasive plant species. Invasive plant occurrence would be mapped and quantified. Control efforts would be documented with GPS and stored in GIS databases for further analysis. The estimated first-year cost is \$35,000, with a recurring cost of \$5,000 per year.

Project Category 6: Improve Cropland Management

Habitat management at Wheeler Complex includes overseeing a cooperative farming program to provide food for wildlife. Currently, farmers plant between 3,500 - 4,000 acres at Wheeler NWR and 290 acres at Key Cave NWR annually through cooperative farming agreements. In addition, the Complex conducts a limited amount of force-account (in-house) farming as budgets and workforce allow. This project category is comprised of two projects (6A and 6B). One project is designed to convert the current farming program to contract farming and the other to increase the Complex's ability to conduct force account farming. (Linkages: Objectives 1.1, 1.4, 1.6, and 2.4)

Project 6A: Convert Cooperative Farming to Contract Farming – RONS #00027 Wheeler NWR

Project 6A would provide funding to convert the current cooperative farming program to contract farming. Contract farming would increase wildlife benefits through conversion of unneeded rental cropland to wildlife habitat. The total land base utilized by farming would be reduced by up to 50 percent, permitting the utilization of up to 2,000 acres as wildlife habitat instead of as cleared farmland. The estimated first-year cost of this project is \$405,000, with a recurring cost of \$300,000.

Project 6B: Increase Force-Account (Using Complex Staff and Equipment) Farming Capabilities – New Project for Wheeler and Key Cave NWRs

Project 6B would provide funding to increase the Complex's ability to conduct force-account farming. This action would allow for more precise and timely placement of food for wildlife. Costs associated with this project include the purchase of seed, fertilizer, soil amendments, pesticides, equipment, and diesel fuel for conducting force-account farming. The estimated first-year cost of this project is \$350,000, with a recurring cost of \$100,000.

Project Category 7: Improve Habitats at Key Cave Refuge

Successful habitat management at Key Cave NWR is important to the conservation and continued existence of the Alabama cavefish, serving as the primary recharge area for Key Cave. Approval of the projects in this category would support habitat improvements, such as restoring native warm season grasses and upland hardwoods. These actions would help improve water quality in the watershed to benefit the endangered species in Key Cave and provide habitat for migratory birds. This project category is comprised of nine projects (7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H, and 7I), which include the addition of one staff position. (Linkages: Objectives 1.13, 1.14, 1.20, and 1.21; 2.5 and 2.7; and Objectives 3.4 and 3.7)

Project 7A: Restore and Maintain Habitats by Establishing a New Tractor Operator Position – RONS #97009 Key Cave NWR

Project 7A would provide funding for the hiring of a Tractor Operator at the unstaffed Key Cave NWR to conduct activities such as planting native warm season grasses and hardwood tree species, constructing check-dams for erosion control, and performing general maintenance. All management activities are currently conducted by staff at Wheeler NWR, an already understaffed refuge located more than one hour away from Key Cave NWR. The estimated first-year cost of this project is \$122,000, with a recurring cost of \$57,000.

Project 7B: Re-establish Native Grasses and Forested Uplands – RONS #00012 Key Cave NWR

Project 7B would provide funding for the re-establishment of native grasses and forested uplands at Key Cave NWR. Native warm season grass seed and hardwood tree seedlings are expensive and require labor to plant. In addition, prescribed burning and other disturbance techniques would have to occur. The estimated first-year cost of this project is \$35,000, with a recurring cost of \$15,000.

Project 7C: Purchase a New Truck-Tractor – RONS #00029 Key Cave NWR

Project 7C would provide funding for the purchase of a large truck-tractor unit to assist in restoration and maintenance of native warm season grasses at Key Cave NWR. The estimated first-year cost of this project is \$125,000, with a recurring cost of \$5,000.

Project 7D: Purchase a New Lowboy Trailer – RONS #00028 Key Cave NWR

Project 7D would provide funding for the purchase of a 45-foot lowboy trailer that would be used in the restoration and maintenance of native warm season grasses at Key Cave NWR. The estimated first-year cost of this project is \$90,000, with a recurring cost of \$3,500.

Project 7E: Purchase a New Medium Tractor and Rotary Mower – RONS #00026 Key Cave NWR

Project 7E would provide funding for the purchase of a 100-horsepower tractor and batwing rotary mower to assist in the restoration and maintenance of native warm season grasses at Key Cave NWR. The estimated first-year cost of this project is \$120,000, with a recurring cost of \$5,000.

Project 7F: Purchase a New Cover Disk – RONS #00030 Key Cave NWR

Project 7F would provide funding for the purchase of a 20-foot cover disk to assist in the restoration and maintenance of native warm season grasses at Key Cave NWR. The estimated first-year cost of this project is \$20,000, with a recurring cost of \$1,000.

Project 7G: Purchase a New Small Tractor and Rotary Mower – RONS #00025 Key Cave NWR

Project 7G would provide funding for the purchase of a 45-horsepower (PTO) tractor and 8-foot rotary mower to assist in the restoration and maintenance of native warm season grasses at Key Cave NWR. The estimated first-year cost of this project is \$25,000, with a recurring cost of \$2,500.

Project 7H: Purchase a New Native Grass Drill and Spray Rig – RONS #00027 Key Cave NWR

Project 7H would provide funding for the purchase of a 12-row native grass drill to assist in the restoration and maintenance of native warm season grasses at Key Cave NWR. The estimated first-year cost of this project is \$20,000, with a recurring cost of \$3,000.

Project 7I: Improve the Water Holding Capacity of Shallow Water Areas – New Project for Key Cave NWR

Project 7I would provide funding for rehabilitating the underlying soil of three shallow water areas to improve their water holding capacities. When properly mixed and compacted, bentonite clay has been shown to be successful in sealing leaky ponds. Success of the project would result in the creation of 16 acres of waterfowl and waterbird habitat at Key Cave NWR. The total estimated first-year cost of this project is \$30,000, with a recurring cost of \$5,000.

RESOURCE PROTECTION

Project Category 8: Increase Law Enforcement (LE) Activities

Wheeler Complex currently relies on only two full-time law enforcement officers (LEOs) whose time is split covering a 7-Refuge Complex spread over 12,500 square miles of northern Alabama. Public use has continued to increase each year with issues requiring LE, such as vandalism, littering, compliance with access, and public use regulations. This project category is comprised of two projects (8A and 8B), which include the addition of one LE staff position and the purchasing of special surveillance equipment. (Linkages: Objective 3.1, 4.1, 4.12, and 5.1.)

Project 8A: Increase Resource and Visitor Protection by Establishing an Additional Law Enforcement Officer (LEO) – RONS #03012 Wheeler Complex

Project 8A would provide funds for the hiring of an additional full-time LEO for the Wheeler Complex to ensure the safety of the visiting public and increase the protection of natural resources and facilities. An additional officer would reduce the amount of overtime current LE officers must work in order to provide public safety. The estimated cost is \$140,000, with a recurring cost of \$75,000 per year.

Project 8B: Increase Law Enforcement (LE) Capabilities by Purchasing Specialized Surveillance Equipment – New Project for the Wheeler Complex

Project 8B would provide funding for purchasing state-of-the-art surveillance equipment for the Complex's LEOs to ensure the safety of the visiting public and increase the protection of Complex natural resources and facilities. Costs associated with this project include the purchase of equipment and labor for installation. The estimated first-year cost is \$10,000, with a recurring cost of \$1,000 per year.

Project Category 9: Increase Land/Water Conservation and Protection

The health of aquatic ecosystems, systems that also provide human drinking water and irrigation water, is directly linked to the health of the land. Land conservation measures are critical actions needed for protecting and improving water resources. Complex management supports both land and water conservation measures, however efforts are currently limited. This project category is comprised of five projects (9A, 9B, 9C, 9D and 9E) that would provide resources and additional staff to develop both land and water conservation programs. Costs associated with these projects include the purchase of equipment and the increase in two staff positions. (Linkages: Objective 1.21, 3.4, 3.6, and 3.7)

Project 9A: Conduct Needed Water Quality Monitoring by Establishing a Biological Science Technician Position – RONS #99004 Wheeler Complex

Project 9A would provide funding for the development of a comprehensive water quality monitoring program for the Wheeler Complex. Areas adjacent to the refuges are under intense industrial, agricultural, and residential development (especially Wheeler NWR). Consequently, water quality may be declining. This project would result in the establishment of 25 permanent water quality stations where water would be sampled monthly. Funds from this project would also be allocated to hire an additional Biological Science Technician for the Complex to conduct the program. The estimated first-year cost is \$213,000, with a recurring cost of \$98,000 per year.

Project 9B: Establish a Contaminants Program – New Project for Wheeler Complex

Project 9B would provide funding for the development of a comprehensive contaminants monitoring program for the Wheeler Complex. Areas adjacent to the refuges are under intense industrial, agricultural, and residential development, which may produce contaminants (especially Wheeler NWR). In addition, the Redstone Arsenal military installation has released contaminants into refuge waters in the past. Funds from this project would hire a Contamination Specialist to conduct the program. The estimated first-year cost is \$125,000, with a recurring cost of \$85,000 per year.

Project 9C: Analyze Water Quality Impacting Endangered Alabama Cavefish – RONS #97011 Key Cave NWR

Key Cave NWR is critical for the conservation and continued existence of the Alabama cavefish. The quality of water entering the cave system from its recharge area is of utmost importance to Alabama cavefish survival. Project 9C would provide funding for the development of a water quality sampling and analysis program in Key Cave. Results would be monitored over time to determine if habitat restoration activities are effective in improving water quality in the recharge area and enhancing habitat for this endangered fish. The estimated first-year cost is \$22,000, with a recurring cost of \$12,000 per year.

Project 9D: Develop a Complex-Wide Litter Control and Reduction Program – New Project for the Wheeler Complex

As urbanization continues to increase at an alarming rate, more and more of the Wheeler Complex is experiencing problems from littering (especially Wheeler NWR). Not only are visitors leaving trash, but construction materials and household garbage are being dumped on Service lands. Project 9D would provide funding for the development of a litter control and reduction program for the Complex. The estimated first-year cost is \$15,000, with a recurring cost of \$4,000 per year.

Project 9E: Conduct a Study to Analyze Existing Rights-of-Ways (ROW) – New Project for Wheeler NWR

Project 9E would provide funding to conduct a study that would identify and analyze the impacts of existing rights-of-way (ROW) easements on Wheeler NWR. Currently, there are approximately 60 rights-of-way crossing refuge lands. Results from the study would help determine if the current refuge policy should be altered or updated. Global positioning systems (GPS) and GIS technologies will be used to locate and record ROW easements locations. The estimated first-year cost is \$20,000, with a recurring cost of \$1,000.

Project Category 10: Increase Cultural Resource Protection

As required by the Archaeological Resources Protection Act, and other legal mandates, it is the duty of each land management agency to identify, research, and protect cultural resources. Projects in this category would provide funding for conducting research and developing scientific reports to identify cultural resources located on lands within the Wheeler Complex. The funding of these projects is essential to help Complex management meet Federal cultural resource mandates. This project category is comprised of two projects (10A, and 10B). (Linkage: Objective 3.2)

Project 10A: Develop a Cultural Resource Overview of the Wheeler Complex – New Project for the Wheeler Complex

Project 10A would provide funding to develop and publish a cultural resources overview for each refuge in the Wheeler Complex. The cultural resources overview would include information about the area's geomorphology, cultural history, paleo-environmental reconstruction, history of past archaeological investigations on and near each refuge, and a list of the Complex's historical properties. The estimated first-year cost of this project is \$20,000, with a recurring cost of \$0.

Project 10B: Conduct a Comprehensive Cultural Resource Inventory of the Wheeler Complex – New Project for the Wheeler Complex

Project 10B would provide funding to conduct a comprehensive archaeological survey of each refuge in the Wheeler Complex in coordination with Service policy. This survey would use scientific methods to inventory and then evaluate the National Register's eligibility of historic properties. The estimated first-year cost of this project is \$150,000, with a recurring cost of \$15,000.

VISITOR SERVICES

Project Category 11: Expand Visitor Services and Volunteer Capabilities

The Wheeler Complex is located near several major population centers, with more than four million inhabitants within 200 miles of Complex lands. For the past five years, the Wheeler Complex has averaged over 650,000 visitors annually. Projects within this category would support both the expansion of visitor services and volunteer programs. The project category is comprised of four projects (11A, 11B, 11C, and 11D), which include the addition of one staff member. (Linkages: Objectives 4.1 and 4.8)

Project 11A: Expand Visitor Programs by Establishing an Additional Park Ranger Position – RONS #00012 Wheeler NWR

Project 11A would provide funding to hire an additional Park Ranger to support expansion of public use activities at Wheeler NWR. Public use opportunities would be broadened to fulfill requests for on- and off-site programs, including expanded community outreach and the growing volunteer program and would result in additional wildlife observation opportunities. The estimated first-year cost of this project is \$118,000, with a recurring cost of \$53,000.

Project 11B: Purchase a Volunteer Rover Vehicle – RONS #00020 Wheeler NWR

Wheeler NWR receives more than 650,000 visitors annually, with 10 percent or less of those using the Visitor Center. With over 100 miles of roads used by refuge visitors, an outstanding opportunity exists to contact visitors with the use of volunteers. The addition of a volunteer vehicle would enhance the refuge's environmental education and outreach efforts by providing volunteers with additional transportation. Project 11C would provide funding for the purchase of a volunteer rover vehicle for use by refuge volunteers during outreach activities. The estimated first-year cost of this project is \$30,000, with a recurring cost of \$5,000.

Project 11C: Replace Secondary and Sub-entrance Signs – SAMMS #80103371 Wheeler NWR

Visitors to Wheeler NWR depend on signage to alert them to refuge entrances, units, boundaries, and other features. Over the past 10 years, a number of secondary and sub-entrance signs have weathered, been vandalized, and/or otherwise been damaged beyond repair. Project 11D would provide funding for the purchase of secondary and sub-entrances signs to be placed at appropriate locations. The estimated first-year cost of this project is \$27,000, with a recurring cost of \$4,000.

Project Category 12: Expand Hunting Program

Hunting is an extremely popular activity at Wheeler NWR. Public scoping comments have indicated a desire to expand the ability to monitor the health of the white-tailed deer population on Wheeler NWR. The project (12A) in this category would support the expansion of the deer monitoring program by constructing a new self-service deer weigh-in and health check station. (Linkage: Objective 4.1)

Project 12A: Construct a Self Service Deer Weigh-In / Health Check Station – New Project for Wheeler NWR

Project 12A would provide funding for the design and construction of a self-service deer weigh-in and health check station at Wheeler NWR. This facility would function as a full-service, self-service check station, where hunters would collect and record data themselves. The walls of the check station would be covered with educational posters; publications, charts, and data sheets that would help the hunters learn more about sound deer management and keep track of the deer harvest on the refuge. The posters would also assist hunters in determining approximate age and the overall health of the deer.

At the station, hunters would be encouraged to fill out deer sighting cards and record post-harvest data, including hours hunted, deer sighted, field-dressed weights, sex, number of points on antlered deer, county in which deer were harvested, and approximate age. The estimated first-year cost for this project is \$60,000, with a recurring cost of \$3,000.

Project Category 13: Increase Wildlife Observation and Photography Opportunities

Wildlife observation and photography are quickly becoming popular activities on Complex lands. As a result, Complex management has recently renovated or constructed several wildlife viewing and photography facilities at Wheeler, Key Cave, and Sauta Cave NWRs. Projects in this category are designed to expand wildlife observation and photography opportunities on Complex lands. This project category is comprised of five projects (13A, 13B, 13C, 13D, and 13E). (Linkages: Objective 4.3)

Project 13A: Develop a Wildlife Observation Building Live Camera – RONS #00025 Wheeler NWR

Project 13A would provide funding for the purchase and installation of a remote live video camera for the Wildlife Observation Building. The Display Pool area adjacent to the Wildlife Observation Building provides a unique opportunity to observe wildlife in a natural setting. Thousands of ducks, geese, and cranes use the area for feeding and resting from November through February, and an amazing variety of other wildlife species use the area year-round.

The remote live video camera, mounted on the Wildlife Observation Building, could be accessed via the Internet and would offer a unique look at the wide variety of wildlife using the area. The live video camera would be part of a web site providing information on Wheeler NWR and the National Wildlife Refuge System and would be available to Internet users, greatly enhancing outreach efforts. The estimated first-year cost of this project is \$69,000, with a recurring cost of \$12,000.

Project 13B: Increase Wildlife Observation and Photography by Constructing an Additional Wildlife Observation Tower – New Project for Wheeler NWR

One of the most popular wildlife observation facilities at Wheeler NWR is the wildlife observation tower located on the Beaverdam Peninsula. Project 13B would provide the funding to construct an additional wildlife observation tower at Wheeler NWR. The location of the tower has yet to be determined but possible sites include sites overlooking the Mooresville Peninsula and the White Springs #2 Waterfowl Impoundment. The estimated first-year cost of this project is \$60,000, with a recurring cost of \$2,000.

Project 13C: Increase Wildlife Observation and Photography by Constructing a Wildlife Photography Blind on the North Side of the Tennessee River – New Project for Wheeler NWR

Wheeler NWR currently has only one wildlife photography blind in operation. It is located on the south side of the Tennessee River near the Display Pool at the refuge's Visitor Center and has recently been renovated. However, many wildlife photography enthusiasts live on the north side of the Tennessee River near the cities of Athens, Madison, and Huntsville, Alabama.

Project 13C would provide funding to construct a new wildlife photography blind on the north side of the Tennessee River. Possible sites include areas near the Penny Bottoms Impoundment, Buckeye Impoundment, and/or the Thorson Arm Impoundment. Completion of this project would provide additional opportunities for capturing wildlife photographs. The location of the blind has yet to be determined. The estimated first-year cost of this project is \$10,000, with a recurring cost of \$1,000.

Project 13D: Construct Wildlife Drive (Auto Tour) – SAMMS #97123406 Wheeler NWR

Project 13D would provide funding for the construction of a wildlife drive (auto tour) at Wheeler NWR. A Wheeler NWR AutoTour informational brochure would be developed along with interpretive stops along the drive, allowing the visitors to travel at their own paces. The wildlife drive would expose each visitor to a variety of refuge habitats and various wildlife management programs. The completion of this project would help reach visitors who do not use the refuge's Visitor Center facilities. The estimated first-year cost is between \$1.5 - 3.0 million, with a recurring cost of \$25,000.

Project 13E: Construct Cave Springs Kiosk and Viewing Platform – SAMMS #00124021 Wheeler NWR

Cave Springs Cave, located at Wheeler NWR, provides crucial habitat for the endangered gray bat. During summer months, bats can easily be seen exiting the cave at dusk to forage. The cave is gated and closed to all public entry, but the public often visit the area to watch evening emergences. Project 13E would provide funding to construct a 30-foot by 10-foot wooden platform near the cave entrance from which to view the emerging bats. The platform would also be used for interpretation and educational activities during the summer months. A wooden kiosk would be constructed adjacent to the overlook to provide year-round information on bats and cave ecosystems. The estimated first-year cost of this project is \$31,000, with a recurring cost of \$2,500.

Project Category 14: Expand Environmental Education and Wildlife Interpretation Programs

The focal point of public use on Wheeler NWR is the Visitor Center (Givens Interpretive Center). In addition to providing public use opportunities for 34,000 visitors annually, the Visitor Center presently provides environmental education and wildlife interpretation opportunities for approximately 10,000 local students annually. Projects in this category are designed to expand the environmental education and wildlife interpretation programs for the Complex by building and staffing a new Environmental Education Center. This project category is comprised of eight projects (14A, 14B, 14C, 14D, 14E, 14F, 14G, and 14H), which include the addition of four new staff members. (Linkages: Objectives 4.4-5)

Project 14A: Construct Environmental Education Center – SAMMS #00110155 Wheeler NWR

The current Visitor Center, located at Wheeler NWR, was not designed to provide the current and expanded levels of environmental education that occur each year. Project 14A would provide funding for the construction of an Environmental Education Center that would increase the environmental education programs that could be offered to an additional 15,000 area students annually. Additionally, this new facility would provide laboratory space to conduct scientific investigations. The estimated first-year cost of this project is \$795,000, with a recurring cost of \$25,000.

Project 14B: Coordinator for Proposed Environmental Education Center – RONS #00024 Wheeler NWR

Project 14B would provide funding to hire an Environmental Education Coordinator to administer the proposed environmental education center and its associated programs. Current staffing levels are inadequate to serve the new Environmental Education Center. The estimated first-year cost of this project is \$140,000, with a recurring cost of \$89,000.

Project 14C: Education Resource Specialist for Proposed Environmental Education Center – RONS #00023 Wheeler NWR

Project 14C would provide funding to hire an Education Specialist to develop environmental education programs for the proposed Environmental Education Center. The estimated first-year cost of this project is \$140,000, with a recurring cost of \$75,000.

Project 14D: Park Ranger for the Proposed Environmental Education Center – RONS #00004 Wheeler NWR

Project 14D would provide funding to hire an additional Park Ranger to staff the proposed Environmental Education Center and assist in environmental education classes and activities. The estimated first-year cost of this project is \$128,000, with a recurring cost of \$63,000.

Project 14E: Maintenance Worker for the Proposed Environmental Education Center – RONS #00003 Wheeler NWR

Even new facilities require daily, weekly, and monthly maintenance. Project 14E would provide funding to hire an additional Maintenance Worker to perform building maintenance and repair on a proposed Environmental Education Center. The estimated first-year cost of this project is \$113,000, with a recurring cost of \$49,000.

Project 14F: Construct a Simulated Cave Exhibit to Interpret Protected Sensitive Areas – RONS #00015 and SAMMS #00124023 Wheeler NWR

Project 14F would provide funding for developing and constructing a simulated cave exhibit at the Wheeler NWR Visitor Center. Cave ecosystems are unique and often critical to the health of a community's water supply due to the recharge and filtering of groundwater, yet most people are unaware of this importance and have no concept of their uniqueness. Cave systems provide critical habitat for federally listed species, including Indiana and gray bats, Alabama cavefish, and American Hart's-tongue fern. A simulated cave exhibit would provide educational information and increase public awareness of the importance of cave habitats. The estimated first-year cost of this project is \$80,000, with a recurring cost of \$10,000.

Project 14G: Develop a Visitor Center Interactive Education Exhibit – RONS #00017 Wheeler NWR

Project 14G would provide funding to purchase an interactive computer exhibit for the Wheeler NWR Visitor Center. A system with software programs geared toward different user groups would provide interactive learning for individuals and groups. Simulated habitat management, wildlife profiles, information on endangered species, and other options would be offered. The estimated first-year cost of this project is \$30,000, with a recurring cost of \$5,000.

REFUGE ADMINISTRATION

Project Category 15: Improve Safety, Environmental Compliance, and Asset Management

Complex management must address regulatory safety, environmental, and property accountability requirements in a systematic and cost-effective manner. By being proactive, management can help reduce the risk of non-compliance, enhance environmental protection, and improve health and safety practices for both employees and the public. Projects in this category are designed to improve safety programs, environmental compliance, and asset management at the Wheeler Complex. This project category is comprised of three projects (15A, 15B, and 15C), which include the addition of two new staff members. (Linkages: Objectives 5.1-2)

Project 15A: Improve Safety, Environmental Compliance, and Asset Management by Establishing an Assistant Manager Position to Serve as Facilities Manager – RONS #02004 Wheeler NWR

Project 15A would provide funding to hire a safety/environmental compliance coordinator and asset manager to meet ever-increasing demands for environmental compliance and protection. The individual would be responsible for managing the Wheeler Complex's Service Asset and Maintenance Management System (SAMMS) program, while also serving as the Complex's safety officer. Refuge environmental audits and compliance implementation would be coordinated through this position. The estimated cost of this project is \$140,000, with a recurring cost of \$75,000.

Project 15B: Administration of Geographic Information System (GIS) through Establishment of a GIS Coordinator Position – RONS #00001 Wheeler NWR

Effective management on a landscape scale through the use of geographic information systems (GIS) is now available. Project 15B would provide funding to hire a full-time GIS specialist to coordinate the Wheeler Complex's GIS program. The estimated cost of this project is \$154,000, with a recurring cost of \$89,000.

Project 15C: Purchase of a Geographic Information System – RONS #97004 Wheeler NWR

Project 15C would provide funding to purchase a computer server system with updated GIS software. This equipment would enhance management through efficient display, manipulation, and storage of data. The estimated first-year cost of this project is \$50,000, with a recurring cost of \$10,000.

Project Category 16: Improve Maintenance Programs, Facilities, and Road Systems

With over 37,000-acres of refuge lands spread across northern Alabama, the maintenance staff at Wheeler Complex is challenged to adequately provide for existing needs. Projects in this category are designed to improve maintenance programs, facility support, and road system repairs throughout the Wheeler Complex. This project category is comprised of seven projects (16A, 16B, 16C, 16D, 16E, 16F, and 16G), which include the addition of one new staff member. (Linkages: Objective 5.2)

Project 16A: Improve Maintenance Programs by Establishing a Work Leader Position to Supervise the Wheeler Complex Maintenance Program – RONS #00008 Wheeler NWR

Project 16A would provide funding to hire a Work Leader/Wage Supervisor to direct maintenance operations and supervise other maintenance employees on the Wheeler Complex. The estimated first-year cost of this project is \$137,000, with a recurring cost of \$72,000.

Project 16B: Replace Heavy Equipment Wash Rack – SAMMS #98103379 Wheeler NWR

The heavy equipment wash rack at the Complex's headquarters is inadequate for current use. Project 16B would provide funding to replace the existing wash rack with a larger, more efficient wash rack. The estimated first-year cost of this project is \$26,000, with a recurring cost of \$2,000.

Project 16C: Rehabilitate Refuge Boundary – SAMMS #90103372 Wheeler NWR

The Wheeler NWR boundary consists of approximately 200 miles of irregularly shaped boundary interfaced with residential and commercial development. Many of the corner posts have been lost due to a number of factors and are impossible to find. Project 16C would provide funding to contract a retracement survey to relocate approximately 100 corners. The estimated first-year cost of this project is \$82,000, with a recurring cost of \$3,000.

Project 16D: Repair Gravel Road System in Limestone County – SAMMS #00103393 Wheeler NWR

Wheeler NWR is served by a system of gravel roads that are heavily used and require continual maintenance and repair to provide safe travel for refuge staff, the visiting public, and cooperative farmers. Project 16D would provide funding to repair 40 miles of refuge gravel roads in Limestone County. Management options and public use will decline if these roads are not repaired. The estimated first-year cost of this project is \$67,000, with a recurring cost of \$10,000.

Project 16E: Repair Garth Slough Road Damaged by Use and Erosion – SAMMS #99103381 Wheeler NWR

Garth Slough Road at Wheeler NWR provides access to Garth Slough and is subject to continuous wear and erosion. If not repaired and maintained periodically, its use will decrease and refuge management activities will be seriously impacted, reducing the refuge's ability to manage migratory birds and their enjoyment by the visiting public. Project 16E provides funding to repair the Garth Slough Road. The estimated first-year cost of this project is \$27,000, with a recurring cost of \$2,500.

Project 16F: Replace Residence #2 – SAMMS #02120303 Wheeler NWR

Residence #2, constructed in 1941 at Wheeler NWR, is experiencing mounting repair costs due to the age of the structure. Due to the increasingly urban nature of the area and the need to house essential personnel, replacement of the structure will be an advantage to the Government. Project 16F would provide funding to replace residence #2. The estimated first-year cost of this project is \$235,000, with a recurring cost of \$7,000.

Project 16G: Construct a New Refuge Headquarters – SAMMS #00100156 Wheeler NWR

The present headquarters administrative building at Wheeler NWR was constructed in 1980, and is not large enough to house the present staff. Construction of a new headquarters administrative building will increase efficiency and productivity and provide better services to the visiting public. Project 16G would provide funding to construct a new refuge headquarters administrative building at Wheeler NWR. The estimated first-year cost of this project is \$795,000, with a recurring cost of \$15,000.

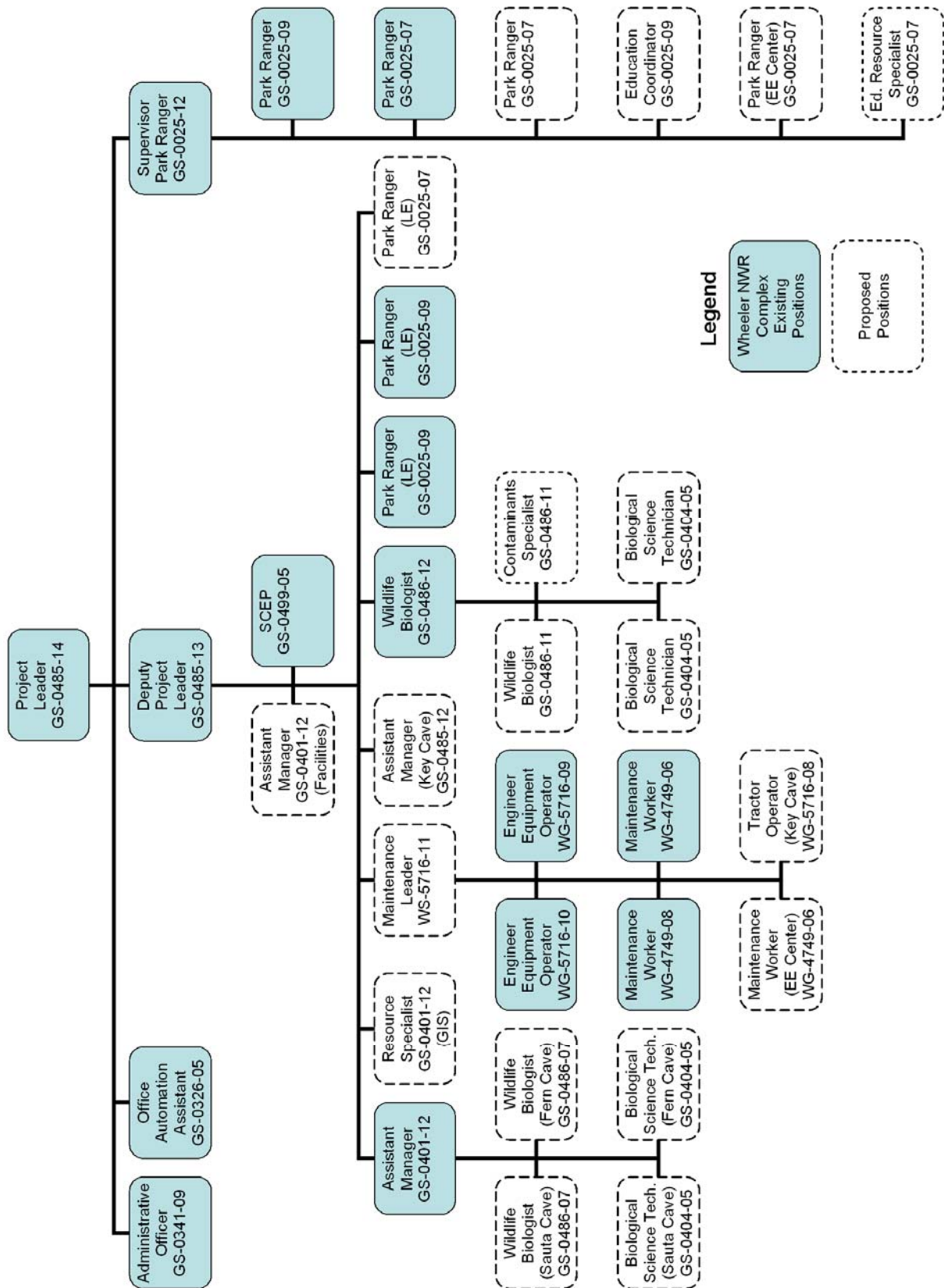
Project Category 17: Provide Updated Vehicles and Equipment for Staff Operations

Complex operations, maintenance, and law enforcement depend on reliable vehicles and safe equipment to accomplish its mission. The Complex uses a combination of trucks, vans, all-terrain vehicles, and boats for access to refuges. These vehicles are subjected to rough terrain and severe duty that effectively shorten their serviceable condition to less than five years. On average, at least two vehicles should be replaced every year and one all-terrain vehicle every third year to maintain a safe and dependable vehicle fleet. In addition, both small and heavy construction equipment must be updated and/or replaced on a scheduled basis. A complete listing of vehicles and equipment with their associated purchase and/or replacement costs can be found in the SAMMS project table, Appendix J. (Linkage: Objective 5.2)

FUNDING AND PERSONNEL

To complete the extensive wildlife habitat management, current restoration projects, and conduct the necessary inventorying, monitoring, and mapping activities, more staff is required. Biological and public use review teams and the general public identified the need for additional staff, especially for Key Cave, Sauta Cave, and Fern Cave NWRs. The following organization chart (Figure 18) outlines the proposed future staffing requirements to implement Alternative D. The rate at which this Complex realizes its full potential to contribute locally, regionally, and nationally to wildlife conservation and appropriate and compatible wildlife-dependent recreation and environmental education is totally dependent upon receiving adequate resources.

Figure 18. Wheeler National Wildlife Refuge Complex proposed future staffing chart



PARTNERSHIP/VOLUNTEER OPPORTUNITIES

A key element of this CCP is to establish partnerships with local volunteers, landowners, private organizations, and State and Federal natural resource agencies. Partnerships assist in conserving resources and providing recreational opportunities for all of the refuges in the Tennessee River Valley.

Wheeler Complex already cooperates with many organizations and individuals on important projects, including other agencies such as the Tennessee Valley Authority (TVA), Alabama Division of Wildlife and Freshwater Fisheries (ADFWW), and other non-governmental conservation groups, such as The Nature Conservancy (TNC). In addition, the refuge has partnered with and will continue to partner with local police and volunteer fire departments; nonprofit conservation organizations, such as the Audubon Society and Ducks Unlimited (DU); broad conservation initiatives, such as North American Bat Conservancy Partnerships Strategic Plan and Partners In Flight; and last, but not least, many private individuals.

New partnerships may be able to be established with agencies such as U.S. Geological Survey (USGS), National Wild Turkey Federation, U.S. Army Corps of Engineers (USACE), and Alabama's Department of Environmental Management (ADEM). In addition, this CCP supports the NABCI Partners-in-Flight Initiative, North American Waterfowl Management Plan, U.S. Shorebird and Wading Bird plans, Lower Tennessee-Cumberland Ecosystem Plan, Partners for Amphibian and Reptile Conservation (PARC), the Northern Bobwhite Conservation Initiative, and the American Woodcock Management Plan.

Successful partnerships will be essential for achieving the goals, objectives, and strategies set forth by this plan. This broad-based approach to managing fish and wildlife resources extends beyond social and political boundaries and requires a foundation of support from many. The Wheeler Complex will continue to seek creative partnership opportunities to achieve its vision for the future.

STEP-DOWN MANAGEMENT PLANS

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

MONITORING AND ADAPTIVE MANAGEMENT

Adaptive management is a flexible approach to long-term management of biotic resources that is directed over time by the results of ongoing monitoring activities and other information. More specifically, adaptive management is a process by which projects are implemented within a framework of scientifically driven experiments to test the predictions and assumptions outlined within a plan. To apply adaptive management, specific survey, inventory, and monitoring protocols will be adopted for the Complex. The habitat management strategies will be systematically evaluated to determine management effects on wildlife populations. This information will be used to refine approaches and determine how effectively the objectives are being accomplished. Evaluations will include ecosystem team and other appropriate partner participation. If monitoring and evaluation indicate undesirable effects for target and non-target species and/or communities, then alterations to the management projects will be made. Subsequently, the Complex's CCP will be revised. Specific monitoring and evaluation activities will be described in the step-down management plans.

Table 11. Wheeler National Wildlife Refuge Complex step-down management plans and associated completion dates

| Step-down Plan | Completion Date |
|--|------------------------|
| Wildlife Management Plan | 2010 |
| Biological Inventory/Monitoring Plan | 2009 |
| Endangered Species Recovery Plan | 2008 |
| Migratory Bird Disease | 2009 |
| Habitat Management | 2010 |
| Moist Soil/Water Management | 2009 |
| Forest Management | 2008 |
| Cropland Management | 2009 |
| Integrated Pest Management | 2009 |
| Nuisance Animal Control | 2008 |
| Exotic Plant Control | 2009 |
| Wildland and Structural Fire Management | 2008 |
| Law Enforcement | 2008 |
| Cultural Resources Management Plan | 2009 |
| Visitor Services Plan | 2009 |
| Hunting and Fishing | 2008 |
| Wildlife Observation and Photography | 2008 |
| Environmental Education and Interpretation | 2008 |
| Signage Plan | 2007 |
| Safety/Contingency Plan | 2008 |
| Oil and Hazardous Substances | 2008 |

Note: Plans are shown in sequence according to goals and objectives listed in Chapter IV of this plan. Dates are based on plan approval in 2007.

PLAN REVIEW AND REVISION

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

SECTION B. FINAL ENVIRONMENTAL ASSESSMENT

Chapter I. Background

INTRODUCTION

The Fish and Wildlife Service prepared this Environmental Assessment for the Wheeler National Wildlife Refuge (NWR) Complex in compliance with the National Environmental Policy Act (NEPA) and the National Wildlife Refuge System Improvement Act of 1997. The National Wildlife Refuge System Improvement Act of 1997 requires the development of comprehensive conservation plans (CCPs) for all refuges. Following a public review and comment period on the Draft CCP, a final decision was made by the Fish and Wildlife Service that will be used to guide management actions and decisions over the next 15 years, provide understanding about the Complex and its management activities, and incorporate information and suggestions from the public and partners.

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

An environmental assessment determines and evaluates a range of reasonable management alternatives. The intent is to support informed decision-making regarding future management of the Wheeler Complex. Each alternative presented in this environmental assessment was generated with the potential to be fully developed into a final comprehensive conservation. The predicted biological, physical, social, and economic impacts of implementing each alternative are analyzed in this environmental assessment. This analysis assists the Fish and Wildlife Service in determining if the alternatives represent no significant impacts, thus requiring the preparation of a Finding of No Significant Impact (FONSI), or if the alternatives represent significant impacts, thus requiring more detailed analysis through an Environmental Impact Statement (EIS) and a Record of Decision (ROD).

For the Wheeler Complex, the planning team, in accordance with guidelines of the National Wildlife Refuge System Improvement Act, identified issues, concerns, and needs through discussions with the public, agency managers, conservation partners, and others. From these issues, concerns, and needs, the Service's planning team identified four alternatives, evaluated the possible consequences of implementing each alternative, and selected Alternative D as the preferred management action. In the opinion of the Service and the planning team, Alternative D is the best approach to guide the management direction of the Wheeler Complex.

This CCP is needed to address current management issues, to provide long-term management direction for the Complex, and to satisfy the legislative mandates of the National Wildlife Refuge System Improvement Act of 1997, which requires the preparation of a comprehensive conservation plan for all national wildlife refuges. Following public review and comment, the Fish and Wildlife Service developed this CCP and Final Environmental Assessment for the Wheeler Complex.

PURPOSE AND NEED FOR ACTION

The purpose of the environmental assessment is to meet the purpose(s) of the refuge and the goals identified in the comprehensive conservation plan (for which we evaluate each alternative). The purpose is to ensure that Wheeler Complex serves as a sanctuary for migratory birds; protects a variety of habitats to support native diversity; sustains an abundance of waterfowl and other migratory birds; conserves rare, threatened, endangered, and other imperiled species; controls and eliminates exotic, invasive, and nuisance species; provides opportunities for enjoyment of appropriate and compatible, wildlife-dependent recreation; promotes awareness and appreciation of natural resources; promotes support for refuge management activities; coordinates with a wide variety of governmental and non-governmental partners; protects and preserves archaeological and historical resources; protects outstanding natural, scenic, and ecologic values; and provides for appropriate and compatible scientific research.

The need of the environmental assessment is to adopt a 15-year management plan that provides guidance for future management of Wheeler, Key Cave, Sauta Cave, and Fern Cave NWRs and that meets the mandates of the National Wildlife Refuge System Improvement Act of 1997. Currently, there is no comprehensive plan that identifies priorities and ensures consistent and integrated management of the Wheeler Complex, thus necessitating the need for this CCP.

DECISION FRAMEWORK

Based on this Final Environmental Assessment, the Fish and Wildlife Service selected Alternative D to be implemented in the CCP for the Wheeler Complex. This CCP includes a Finding of No Significant Impact FONSI (Appendix N), which is a statement explaining why the selected alternative will not have a significant effect on the quality of the human environment. This determination is based on an evaluation of the Service and Refuge System missions, the purpose(s) for which the refuges in the Wheeler Complex were established, and other legal mandates. Implementation of the CCP will begin and will be monitored annually and revised when necessary.

PLANNING STUDY AREA

The planning study area for this Final Environmental Assessment includes four national wildlife refuges, Wheeler NWR (established in 1938), Key Cave NWR (1997), Sauta Cave NWR (1978), and Fern Cave NWR (1981) and five Farm Service Agency (FSA) conservation easements (Figure 1). All of these refuges are located in northern Alabama in an area locally known as the Tennessee River Valley. Refuge boundaries are found within the counties of Lauderdale, Limestone, Jackson, Madison, and Morgan. Farm Service Agency tracts are located in the counties of Calhoun, Lamar, Limestone, and Marion. Athens, Decatur, Florence, Huntsville, and Scottsboro, Alabama, are the nearest major cities.

The Food Security Act of 1985 (Farm Bill) authorized the Farmers Home Administration (FmHA), now known as the Farm Service Agency (FSA), to convey conservation easements of inventory farm property, without reimbursement, to Federal or State agencies for conservation purposes. During the late 1980s and early 1990s, several thousand acres of land, having high potential fish and wildlife value, were conveyed to the Service by a conservation easement, primarily in the southeastern United States. These tracts ranged in size from a few acres to several thousand acres and posed management problems for the Service due to several reasons, including distance from existing stations and lack of manpower and funding to manage and patrol, as well as trespass and other issues. For the most part, the FSA properties are assigned to the nearest refuge and managed along with other refuge lands based on their habitat types and size.

The Fish and Wildlife Service currently owns and manages 38,723 acres (99 percent) of the 39,206 acres lying within the Wheeler Complex's four refuges' approved acquisition boundaries. The only refuge with land available for acquisition within currently established acquisition boundaries is Fern Cave NWR. The Service will seek to acquire, from willing sellers, the remaining 483 acres within the acquisition boundary (682 acres) of Fern Cave NWR. This process will be conducted in accordance with current Service policy. In addition, the Complex manages 376 acres within five FSA conservation easements (Figure 2). This environmental assessment will identify management on refuge lands, as well as those lands proposed for acquisition by the Service.

AUTHORITY, LEGAL COMPLIANCE, APPROPRIATE USES, AND COMPATIBILITY

The Service developed this plan in compliance with the National Wildlife Refuge System Improvement Act of 1997 and Part 602 of the Fish and Wildlife Service Manual (National Wildlife Refuge System Planning). The actions described within this plan also meet the requirements of the National Environmental Policy Act of 1969. The refuge staff achieved compliance with this Act through the involvement of the public and the incorporation of an environmental assessment in this document, with a description of the alternatives considered and an analysis of the environmental consequences of the alternatives (Chapters III and IV in this section). When fully implemented, the plan will strive to achieve the vision and purposes of Wheeler National Wildlife Refuge Complex.

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

APPROPRIATE USES

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

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

- Six wildlife-dependent recreational uses - As defined by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act), the six wildlife-dependent recreational uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) are determined to be appropriate for refuges. However, the refuge manager must still determine if these uses are compatible.
- Take of fish and wildlife under state regulations - States have regulations concerning take of wildlife that includes hunting, fishing, and trapping. The Service considers the take of wildlife under such regulations appropriate. However, the refuge manager must determine if the activity is compatible before allowing it on a refuge.

COMPATIBILITY

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

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

PUBLIC INVOLVEMENT AND THE PLANNING PROCESS

In accordance with Service guidelines and National Environmental Policy Act (NEPA) recommendations, public involvement has been a crucial factor throughout the development of this Comprehensive Conservation Plan for the Wheeler Complex. This plan has been written with input and assistance from interested citizens, conservation organizations, and employees of local and state agencies.

The participation of these stakeholders and their ideas has been of great value in setting the management direction for the Wheeler Complex. The Service, as a whole, and the Complex staff, in particular, are very grateful to each one who has contributed time, expertise, and ideas to the planning process. The staff remains impressed by the passion and commitment of so many individuals for the lands and waters administered by the Wheeler Complex.

In September 2002, the planning process began with a biological review to assess the status of current biological information and programs, identify information gaps and needs, and gather input on potential management goals and objectives for each refuge in the Complex. A public use review was conducted in October 2003 to provide guidance for managing the education and visitor services programs and resulted in the development of short- to long-term recommendations to improve the quality of visitor experiences and understanding of each refuge in the Complex.

Public input to the development of the CCP was initiated when the notice of intent to prepare a comprehensive conservation plan was published in the Federal Register on July 21, 2005 (70 FR 42084). A CCP mailing list was developed that consisted of individuals from the general public, landowners, state agencies, organizations, governments, Native Americans, and others. On August 30, 2005, over 400 public meeting notices and comment sheets were mailed to those on the mailing list. Comment packets were also available at the public meeting, the Complex office, and Visitor Center, and could be requested via mail or e-mail. Input obtained from all of these meetings and correspondence was considered in developing this CCP and Final Environmental Assessment.

In September 2005, three public scoping meetings were conducted to obtain information and concerns from the public in the communities surrounding the four refuges. Meetings were held in Decatur, Florence, and Scottsboro, Alabama, in coordination with a variety of Federal, State, and local agencies. Announcements were sent to everyone on the CCP mailing list. Articles were written and press releases were distributed to newspapers, magazines, radio, and television stations in advance of the meeting. A total of 48 people attended the meetings.

Refuge maps, comment sheets, planning brochures, and exhibits were available at the meeting. A brief presentation on the planning and environmental compliance processes, an overview of wildlife management activities, and public use opportunities were given. Following the formal presentations, attendees were given the opportunity to express their thoughts and ideas through either verbal or written comments. As of September 30, 2006, 64 comments had been received by the Service.

In November of 2006, an internal review was conducted by the Service and the Wheeler Complex Planning Team. Edits and corrections were made to the document and in April of 2007 the Draft CCP was released for public review. Public comments on the draft document were accepted from April 5 to May 21, 2007. On May 1, 2007, a public meeting was held to provide the public an opportunity to comment on the Draft CCP to the Complex staff.

A wide range of issues, concerns, and opportunities were identified and addressed during the planning process. Many issues that are important to the public often fall outside the scope of the decision to be made within this planning process. In some instances, the Service cannot resolve issues that some people have communicated to us. We have considered all issues throughout our planning process, and have developed a CCP that attempts to balance the competing opinions regarding important issues.

A complete summary of these issues and concerns and the Service's response to comments from the draft CCP public review are provided in Appendix D: Public Involvement - Summary of Public Scoping Comments. These issues are also summarized in Chapter III of the CCP.

Chapter II. Affected Environment

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

Chapter III. Description Of Alternatives

FORMULATION OF ALTERNATIVES

Alternatives are different approaches or combinations of management objectives and strategies designed to achieve the Complex's purpose and vision and the goals identified in the CCP; the priorities and goals of the Lower Tennessee-Cumberland Ecosystem Team; the goals of the Refuge System; and the mission on the Fish and Wildlife Service. Alternatives are formulated to address the priority issues, concerns, and problems identified by the Service and the public during public scoping. To be valid, each alternative must meet all laws, regulations, and Service policies. One aspect of this is that all public use activities will be evaluated for compatibility, using the Service's compatibility determination process. Any current or proposed public use activity that is determined to not meet the requirements of appropriateness and compatibility will be eliminated from any alternative and prohibited on refuge lands.

The four alternatives identified and evaluated represent different approaches to provide permanent protection, restoration, and management of the Complex's fish, wildlife, plants, habitats, and other resources, as well as appropriate and compatible wildlife-dependent recreation. Complex staff assessed the biological conditions and analyzed the external relationships affecting each refuge in the Complex. This information contributed to the development of Complex goals and, in turn, helped to formulate the alternatives. As a result, each alternative presents different sets of objectives for reaching Complex goals. Each alternative was evaluated based on how much progress it would make and how it would address the identified issues related to fish and wildlife populations, habitat management, resource protection and conservation, visitor services, and Complex administration. A summary of the four (4) alternatives is provided in Table 13.

DESCRIPTION OF ALTERNATIVES

Serving as a basis for each alternative, a number of goals and sets of objectives were developed to help achieve the Complex's purposes and the mission of the Refuge System. Objectives are desired conditions or outcomes that are grouped into sets and, for this planning effort, consolidated into four alternatives. These alternatives represent different management approaches for managing the Wheeler Complex over a 15-year time frame, while still meeting the purposes and goals of each individual refuge. The four (4) alternatives are summarized below.

ALTERNATIVE A - NO ACTION (CURRENT MANAGEMENT)

This alternative, required by NEPA, is the no-action alternative, and provides a baseline against which to compare the three action alternatives (alternatives B, C, and D). Management practices already underway or currently funded would continue and no major changes would be initiated by the Service. Alternative A represents the anticipated conditions of each refuge for the next 15 years, assuming current policies, programs, and activities continue.

Management emphasis would continue to focus on maintaining biological integrity of habitats found on each refuge in the Complex. Current management for migratory birds would continue to provide 4,800 – 5,900 acres of habitat capable of meeting forging objectives for an over-wintering population of 53,000 ducks and 17,000 geese and cranes, partially contributing to the objectives of the North American Waterfowl Management Plan.

Low-intensity surveying and incidental management of colonial waterbirds, shorebirds, neotropical migratory birds, scrub-shrub birds, grassland birds, and other resident birds would continue, with no additional management. Only low-intensity monitoring of reptiles and amphibians with incidental management would occur and the main objective for game species management would be to sustain healthy populations through current habitat management and hunting programs. Conservation of federally listed threatened and endangered species would continue to be accomplished through established partnerships. Other wildlife management programs would continue to be developed and implemented with little baseline biological information on most species or groups of species.

Complex staff would continue efforts to slow the spread of exotic, invasive, and/or nuisance animal species on the Complex, such as feral hogs, beavers, resident geese, feral dogs, and feral cats. If these species were not controlled they would continue to destroy habitat and interfere with other wildlife. Feral hogs would continue to be taken during Wheeler NWR's white-tailed deer hunting season and through limited trapping. Complex staff would continue to remove beaver dams and nuisance beavers at Wheeler NWR. In addition, a contract with the U.S. Department of Agriculture (USDA) would continue to be funded for removing nuisance beavers.

Existing wetlands, open waters, grasslands, old fields, and bottomland hardwood forest habitats would continue to be managed under current management. An extensive system of levees, water control structures, and pumps would continue to be maintained to provide crucial habitat for migratory waterfowl. Control of invasive and/or exotic plant species would remain sporadic. Treatment of problem areas would only occur when budget and work force would allow. Other habitat management programs would remain intact with no major changes.

The cooperative farming program would remain unchanged. Farmers would continue to plant between 3,500 and 4,000 acres each year through a cooperative farming agreement in which a portion of the crop (shares) would remain in the fields as rent. Crops planted would include soybeans, winter wheat, and corn. Supplemental foods (milo, millet, winter wheat and corn) would continue to be planted by either force account (using Complex staff and equipment) or by negotiating (share swapping) with the cooperative farmers.

Current levels of law enforcement (LE) would continue with emphasis on resource protection and public safety. Current policy governing rights-of-way (ROW) easements would remain unchanged. Any land acquisition efforts would continue to be addressed in accordance with current service policy. Water quality and quantity information would continue to be limited with only semi-annual water sampling being conducted at nine designated water quality monitoring sites. Twenty-five-foot buffer zones would continue to be placed around any agricultural fields that are adjacent to refuge waters.

Public hunting would continue to be permitted on approximately 18,000 acres at Wheeler NWR and hunting regulations would be published each year in the refuge's hunting permit. White-tailed deer, feral hog, squirrel, rabbit, raccoon, opossum, and northern bobwhite are currently hunted at Wheeler NWR within the State's hunting season framework.

At Key Cave NWR, small game hunting is allowed on 1,060 acres through a permitting program in conjunction with the state's Seven Mile Island Wildlife Management Area. Squirrel, rabbit, raccoon, opossum, mourning dove, and northern bobwhite are hunted within the state hunting season framework. The refuge hunting season runs concurrently with the state hunting season and hunting is allowed on Monday, Tuesday, Friday, and Saturday.

At Sauta Cave NWR, public hunting is allowed on 264 acres through a permitting program in conjunction with the State's North Sauty Wildlife Management Area. White-tailed deer (archery only), squirrel, rabbit, raccoon, and opossum are hunted within the state's season framework. Hunting is not currently allowed on Fern Cave NWR.

Sport fishing on Wheeler and Fern Cave NWRs, including method of take, daily creel limits, possession limits, and size limits, would continue in accordance with State regulations. Under this alternative, approximately 14,000 surface acres of water within the Wheeler NWRs boundary would remain available for fishing. However, special refuge regulations would apply to posted areas.

Wildlife observation, wildlife photography, and environmental education and interpretation would continue at current levels. However, at Wheeler NWR a wildlife drive (auto tour) would be developed and horseback riding would continue to be limited to open gravel and/or paved roads. Horses are not permitted to enter closed areas. The area surrounding Garth Slough would continue to remain closed to all public entry from November 15 through January 15 and Wheeler NWR would continue to be open at night to the general public.

Administration plans would continue to stress the need for the maintenance and rehabilitation of existing infrastructure. Current staffing levels would remain inadequate to meet additional public use and habitat management needs.

Section A, Chapter II, contains more details about the current situation at Wheeler Complex.

ALTERNATIVE B - MAXIMIZE COMPATIBLE WILDLIFE-DEPENDENT PUBLIC USE

Alternative B would provide for more public use opportunities, while maintaining current habitat and wildlife management programs. Additional staff and resources would be dedicated to increasing compatible wildlife-dependent public use opportunities. All habitat management programs, including the cooperative farming program, water level management, moist-soil production, old field maintenance, grassland establishment, and forestry management would continue; however, habitat improvement projects that would benefit compatible wildlife-dependent public use opportunities would be given a higher priority. Law enforcement (LE) activities to provide visitor safety would be intensified.

Under this alternative, hunting and fishing opportunities would be expanded. At Wheeler NWR, the number of hunting days for small game would be increased within the State hunting season framework and an additional youth fishing rodeo would be held annually. The 2,000-acre area around Garth Slough, presently closed to all public entry from November 15 through January 15, would be evaluated for the possible opening of portions of the upland areas to public access under existing gate closure policy; thereby providing additional hunting and other public use opportunities. In addition, the hunting of feral hogs would be allowed during both the large game and small game seasons. At Key Cave NWR, feral hogs would be added to the hunting permit and other hunting opportunities would be explored annually.

Increased wildlife observation and photography opportunities would result from the construction of nine new visitor facilities at Wheeler NWR (three photo blinds, three wildlife observation towers, a wildlife viewing platform, a nature trail, and a wildlife drive). Environmental education and interpretation would be expanded by increasing the number of off-refuge programs with local schools in Lauderdale and Jackson Counties, and by constructing a new environmental education center at Wheeler NWR. New informational brochures would be published for Key Cave, Sauta Cave, and Fern Cave NWRs and visitor access would be improved at Sauta Cave NWR.

Administration plans would stress the need for increased maintenance of existing infrastructure and construction of new facilities that would benefit public use activities. An additional staff of 12 would be required to accomplish the goals of this alternative. Personnel priorities would include employing additional environmental education specialists, a LE officer, and an education coordinator.

ALTERNATIVE C - MAXIMIZE WILDLIFE/HABITAT MANAGEMENT

Alternative C would provide for the restoration of native wildlife, fish, and plant communities and the health of those communities by maximizing wildlife and habitat management, while maintaining current compatible public use opportunities. Federally listed species would be of primary concern, but the needs of other resident and migratory wildlife would also be considered. At each refuge, extensive wildlife, plant, and habitat inventories would be initiated to obtain the biological information needed to implement and monitor management programs. Studies necessary to reduce impacts of contaminants to fish, wildlife, and plants would be developed and a Complex-wide litter control program would be initiated. Research would also be initiated to explore methods for increasing conservation efforts for threatened and endangered species on the Key Cave, Sauta Cave, and Fern Cave NWRs.

Habitat management and maintenance programs for impoundments, old field, cropland, and grasslands would be re-evaluated and step-down management plans would be developed or updated to meet the foraging, resting, and breeding requirements for a variety of species, particularly migratory birds. Cooperative farming would be eliminated and all farming activities would be conducted via contracts or force account (using Complex staff and equipment). Nuisance animal control would be increased by expanding the contract with USDA and forestry management would be increased.

Law enforcement (LE) activities to protect trust resources would be intensified. Additional LE officers would be required. A study to analyze the impacts of existing rights-of-way (ROW) on refuge resources would be initiated and results would determine if current Complex policy concerning easements should be altered. Coordination with local planning and zoning departments would be increased to help minimize encroachment.

Under this alternative, the priority of land acquisition at Fern Cave NWR would remain focused on acquiring land surrounding the fifth cave entrance (Surprise Pit). Based on recommendations from the Alabama Comprehensive Wildlife Conservation Strategy (CWCS), the Wheeler Complex would explore methods to protect lands within the lower reaches of Piney and Limestone Creeks close to Wheeler NWR and lands within the Key Cave high risk water recharge zone close to Key Cave NWR within the 15-year life of the plan.

The Service would work with partners to explore various methods to protect these resources (e.g., through conservation easements, through technical assistance and advice from the Service to the landowner, and through other methods). No Land Protection Plan would be developed as part of this CCP. However, if in the future Service acquisition of these lands was determined to be the most appropriate conservation measure, the Service would undertake all required planning activities (e.g., development of appropriate documents and involvement of interested and potentially affected parties, governmental agencies, and landowners in the process).

Compatible wildlife-dependent recreation activities would continue as currently scheduled, but only when and where they would not detract from, or conflict with, wildlife management activities and objectives. All Complex lands (including Wheeler NWR) would be closed at night to the general public and select areas of high waterfowl use on Wheeler NWR would be closed from November through March, slightly reducing acreages for public hunting and eliminating all night bank fishing.

Administration plans would stress the need for increased maintenance of existing infrastructure and construction of new facilities, benefiting wildlife conservation. An additional staff of 18 would be required to accomplish the goals of this alternative. Personnel priorities would include employing additional wildlife biologists, biological technicians, maintenance workers, a LE officer, a contamination specialist, and a forester.

ALTERNATIVE D - (PROPOSED ACTION) BALANCE WILDLIFE/HABITAT MANAGEMENT WITH COMPATIBLE WILDLIFE-DEPENDENT PUBLIC USE

The proposed action (Alternative D) was selected by the Service and determined to be the alternative that best serves the vision, goals, and purposes of the Wheeler Complex. This alternative strives for a balanced approach for addressing key issues and refuge mandates, while improving wildlife and habitat management on each refuge in the Complex. It is designed to optimize habitat management for the restoration and protection of the Complex's biological diversity, while providing a balance of appropriate and compatible wildlife-dependent recreational and educational programs for visitors.

Under this preferred alternative, existing management activities would continue or would be expanded. Studies necessary to reduce impacts of contaminants to fish, wildlife, and plants would be developed and a Complex-wide litter control program would be initiated. Research would also be initiated to explore methods for increasing conservation efforts for threatened and endangered species on Key Cave, Sauta Cave, and Fern Cave NWRs.

A large majority of Complex lands (including Wheeler NWR) would be closed at night and select areas of high waterfowl use on Wheeler NWR would be closed from November 1 to March 1, slightly reducing acreages for both public hunting and night bank fishing. However, all six improved boat launching facilities and several other designated night bank fishing areas would remain open at night. A night fishing permit would be required. These actions would help reduce illegal activities and human disturbance to wildlife.

Habitat management programs for waterfowl impoundments, old field, cropland, grassland, and forests would be re-evaluated and step-down management plans would be developed or updated to meet the foraging, resting, and breeding requirements for a variety of species, particularly migratory birds. Cooperative farming would continue and areas with water control capabilities would be managed for moist-soil vegetation or would be force-account farmed (with 100 percent of crops left standing) to benefit migratory waterfowl. Nuisance animal control would be increased by expanding the contract with U.S. Department of Agriculture.

Law enforcement (LE) activities to protect resources and provide visitor safety would be intensified. Additional LE officers would be required. A study to analyze the impacts of existing rights-of-way (ROW) on resources would be initiated and results would determine if current Complex policy concerning easements should be altered. Coordination with local planning and zoning departments would be increased to help minimize encroachment.

Under this alternative, the priority of land acquisition at Fern Cave NWR would remain focused on acquiring land surrounding the fifth cave entrance (Surprise Pit). Based on recommendations from the Alabama CWCS, the Wheeler Complex would explore methods to protect lands within the lower reaches of Piney and Limestone Creeks close to Wheeler NWR and lands within the Key Cave high risk water recharge zone close to Key Cave NWR within the 15-year life of the plan.

The Service would work with the partners to explore various methods to protect these resources (e.g., through conservation easements, through technical assistance and advice from the Service to the landowner, and through other methods). No Land Protection Plan would be developed as part of this CCP. However, if in the future Service acquisition of these lands was determined to be the most appropriate conservation measure, the Service would undertake all required planning activities (e.g., development of appropriate documents and involvement of interested and potentially affected parties, governmental agencies, and landowners in the process).

Hunting and fishing would continue with greater emphasis on the quality of the experience and more diverse opportunities, including those for youth and disabled hunters/anglers. At Wheeler NWR, the number of hunting days for small game would be increased within the State hunting season framework and an additional youth fishing rodeo would be held annually. Feral hogs would be hunted during both the large game and small game seasons. At Key Cave NWR, the hunting program would be evaluated annually. Results would dictate if the hunting program should be expanded, reduced, or remain the same.

Increased wildlife observation and photography opportunities would result from the construction of four new visitor facilities at Wheeler NWR (a photo blind, a wildlife observation tower, a wildlife viewing platform, and a wildlife drive) and the maintenance of existing visitor facilities. Environmental education and interpretation would be expanded by increasing the number of off-refuge programs with local schools and by constructing an environmental education center at Wheeler NWR. New informational brochures would be published for Key Cave, Sauta Cave, and Fern Cave NWRs and visitor access would be improved at Sauta Cave NWR.

Administration plans would stress the need for increased maintenance of existing infrastructure and construction of new facilities. Funding for new construction projects would be balanced between habitat management and public use needs. An additional staff of 19 would be required to accomplish the goals of this alternative. Personnel priorities would include employing additional wildlife biologists, biological technicians, maintenance workers, assistant managers, an education coordinator, a LE officer, and a contamination specialist.

FEATURES COMMON TO ALL ALTERNATIVES

Some management programs would occur regardless of the alternative selected for implementation. Features or actions common to all four alternatives are identified and summarized below.

Fish and Aquatic Species - Cooperation with the Alabama Division of Wildlife and Freshwater Fisheries (ADWFF) for fisheries monitoring, implementing aquatic habitat improvement projects, and conducting game and non-game fish surveys would continue and increase as opportunities become available.

Monitoring - Existing migratory bird monitoring, including waterfowl surveys, bald eagle surveys, Christmas Bird Counts, call counts, and breeding bird surveys would continue. More specific monitoring activities may increase to meet other objectives under the various alternatives.

Fire Management - Suppression of all wildland fires would continue. Prescribed fire may be used, in conjunction with other refuge management tools, to reduce hazard fuels, restore natural processes and vitality of ecosystems, improve wildlife habitat, remove or reduce non-native species, and conduct research.

Research - Special use permits would be issued on a case-by-case basis to universities, partners, and other interested parties to perform compatible, appropriate wildlife-related research and/or surveying. Research would continue to be encouraged to evaluate contaminant levels and their impacts on wildlife.

Cultural Resource Protection - Current cultural resource protection efforts would continue, including a partnership with the Tennessee Valley Authority to conduct bank stabilization projects at Wheeler NWR. Efforts to increase cultural resource protection through education and inventories would be explored.

Partnerships - To aid and promote refuge management programs, currently established partnerships with agencies, organizations, and individuals would continue. Additional partnerships would be welcomed.

Volunteers Program - The volunteer program would continue and would likely grow as more individuals become interested in volunteering.

Private Lands Management - Technical assistance for private land management would continue to be offered through the Service's Partners for Fish and Wildlife Program. Efforts to expand the program would be explored.

Farm Service Agency (FSA) Tracts - Current management would continue on all five FSA tracts.

Restrictions/Limitations and Prohibitions – All-terrain vehicle (ATV) would continue to be prohibited on Key Cave, Sauta Cave, and Fern Cave NWRs. On Wheeler NWR, ATVs would continue to be restricted, except by special permit in the designated handicapped accessible hunting area. All lands on Key Cave, Sauta Cave, and Fern Cave NWRs would continue to be closed at night and horseback riding would continue to be prohibited.

COMPARISON OF THE ALTERNATIVES BY ISSUE

Each alternative is different in the type and level of land management and protection it would offer to achieve long-term wildlife and habitat goals. However, each is similar in its approach to managing refuges in the Wheeler Complex. Each alternative would pursue the goals outlined in the CCP; would acquire, protect, and enhance a diverse assemblage of habitat; and would pursue the recovery plans for those threatened and endangered species occurring on the refuges. Each alternative would be consistent with the purpose(s) of each refuge and with the mission and goals of the National Wildlife Refuge System.

Table 12 identifies and compares the management actions under each alternative as a means of responding to the issues raised by Service managers, governmental partners, and the public. These management actions were summarized under the four alternatives previously described to accomplish the Refuge System mission and the purpose(s), vision, and goals of the refuges and to address the priority threats and issues raised by governmental agencies, private citizens, local businesses, and interested organizations. The action alternatives (i.e., B, C, and D) are compared to Alternative A--the no-action alternative.

Table 12. Comparison of alternatives by management issues for Wheeler National Wildlife Refuge Complex

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|--|--|---|--|---|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife-Dependent Public Use |
| <i>Fish and Wildlife Populations Management</i> | | | | |
| Waterfowl (Ducks, Geese, and Cranes) | | | | |
| Wheeler | Each year the refuge provides 28,000 acres of habitat for waterfowl. | Same as Alternative A. | Same as Alternative A, except 3,000 - 5,000 acres of the waterfowl habitat would be closed to public entry to help minimize disturbance to waterfowl. | Same as Alternative C, except 2,000 - 3,000 acres of the waterfowl habitat would be closed to public entry to help minimize disturbance to waterfowl. |
| Key Cave | Low-intensity monitoring and incidental management. | Same as Alternative A. | Efforts to provide suitable waterfowl habitat would be increased. | Same as Alternative C. |
| Waterbirds (Colonial Waterbirds, Marsh Birds, and Shorebirds - including the American Woodcock) | | | | |
| Wheeler | Low-intensity monitoring and incidental management. | Same as Alternative A. | Waterbird management would be initiated in three refuge impoundments and waterbird monitoring increased with bi-weekly surveys. In addition, a woodcock management study would be initiated. | Same as Alternative C, except waterbird management would only be initiated in one refuge impoundment and waterbird surveys conducted monthly. |
| Key Cave | Low-intensity monitoring and incidental management. | Same as Alternative A. | Efforts to provide suitable waterbird habitat would be increased. | Same as Alternative C. |

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|---|--|--|---|--|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife-Dependent Public Use |
| Landbirds (Forest Birds, Grassland Birds, and Scrub-Shrub Birds) | | | | |
| Wheeler and Key Cave | Low-intensity monitoring and incidental management. | Same as Alternative A. | A minimum of 10 point counts would be established in 12 forested blocks (6 > 1,000 acres and 6 < 1,000 acres in size) and “soft” edges would be created along all of agricultural field borders not needed to fulfill waterfowl management goals. | Same as Alternative C, except a minimum of 6 point counts would be established in 12 forested blocks (6 > 1,000 acres and 6 < 1,000 acres in size) and “soft” edges would only be established along 35 percent of the agricultural field borders not needed to fulfill waterfowl management goals. |
| Game Species | | | | |
| Wheeler | Populations managed to provide a quality hunting experience. | Same as Alternative A. | Same as Alternative A, plus white-tailed deer herd health checks would be conducted every 3 years and methods to improve the collection of deer harvest data would be explored. | Same as Alternative C, except white-tailed deer herd health checks would be conducted every 5 years. |

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|--|---|---|---|---|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife- Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use |
| Amphibians and Reptiles | | | | |
| Wheeler, Key Cave, Sauta Cave, and Fern Cave | Low-intensity monitoring and incidental management. | Same as Alternative A. | Effective methods to monitor populations and provide additional habitat for herps would be explored. | Same as Alternative C. |
| Threatened, Endangered, and Imperiled Species | | | | |
| Wheeler | Gray bat and aquatic species are protected by following current management. | Same as Alternative A. | Same as Alternative A, plus threatened and endangered species/habitats would be inventoried and recovery efforts fully supported. | Same as Alternative C. |
| Key Cave | Gray bat and Alabama cavefish are protected by following current management. | Same as Alternative A. | Same as Alternative A, plus threatened and endangered species/habitats would be inventoried and recovery efforts fully supported. Efforts to monitor the Alabama cavefish would increase. | Same as Alternative C. |

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|---|---|--|---|--|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife-Dependent Public Use |
| Sauta Cave | Gray bats, Indiana bats, and Price's potato-bean are protected by following current management. | Same as Alternative A. | Same as Alternative A, plus threatened and endangered species/habitats would be inventoried and recovery efforts fully supported. | Same as Alternative C. |
| Fern Cave | Gray bats, Indiana bats, and the American Hart's-tongue fern are protected by following current management. | Same as Alternative A. | Same as Alternative A, plus threatened and endangered species/habitats would be inventoried and recovery efforts fully supported. Management efforts for conserving the American Hart's-tongue fern would be increased. | Same as Alternative C. |
| Invasive/Nuisance Animals | | | | |
| Wheeler | Population management of problem species is conducted through the established staff trapping and hunting program. | Same as Alternative A, except feral hogs would also be hunted during the small game seasons. | Same as Alternative B, plus beaver control would be intensified by expanding the current USDA contract. | Same as Alternative C. |
| Key Cave | Population management of feral hogs is conducted by limited trapping by staff. | Same as Alternative A, plus feral hogs would be added to the hunting permit. | Same as Alternative A, plus cooperation with partners would be increased. | Same as Alternative C. |

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|---|---|--|--|---|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife-Dependent Public Use |
| Habitat Management | | | | |
| Impoundments and Shallow-Water Areas (including Moist-Soil Production) | | | | |
| Wheeler | Impoundments are maintained by following current management. | Same as Alternative A. | Additional water control structures and pumping stations would be installed. | Same as Alternative C. |
| Key Cave | Three established shallow water areas do not currently hold water. | Same as Alternative A. | Synthetic liners would be used to improve the water holding capacity in three shallow water areas. | Bentonite clay would be used to improve the water holding capacity in one shallow water area. |
| Old Fields | | | | |
| Wheeler | Old fields are managed by following current management. | Same as Alternative A. | Same as Alternative A, plus additional old field habitats would be established. | Same as Alternative C. |
| Croplands | | | | |
| Wheeler and Key Cave | Farmers plant ≈ 3,500-4,000 acres at Wheeler and ≈ 290 acres at Key Cave through a cooperative agreement. Supplemental force account farming is also conducted. | Same as Alternative A, plus funds would be allocated to pay for additional crops, which would be left to benefit game species. | The cooperative farming program would be converted to contract farming. Unused farmland would be converted to other beneficial habitats. | Same as Alternative A, except the use of more contract and/or force account farming would be explored. Unused farmland would be converted to other beneficial habitats. |

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|---|--|---|--|---|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife- Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use |
| Grasslands (Native Warm Season Grasses) | | | | |
| Wheeler | Grasslands are maintained on ≈ 2 acres. | Additional grasslands would be established. | Same as Alternative B. | Same as Alternative B. |
| Key Cave | Grasslands are maintained on ≈ 350 acres. | Additional grasslands would be established. | Same as Alternative B. | Same as Alternative B. |
| Forest Management | | | | |
| Wheeler and Key Cave | No active management. | Same as Alternative A. | Forest management would be increased. | Forest management plans would be updated. |
| Sauta Cave | Forest management of 264 acres is limited. | Same as Alternative A. | Research would be initiated on Price's potato-bean response to different forest management techniques. | Same as Alternative C. |
| Fern Cave | Forest management of 199 acres is limited. | Same as Alternative A. | Forest management would be increased. | Forest management plans would be updated. |
| Invasive Plant Species | | | | |
| Wheeler, Key Cave, Sauta Cave and Fern Cave | Control of invasive and exotic plant species is limited and only conducted when resources allow. | Control of invasive/exotic plant species would be kept to a minimum unless impacting wildlife - dependent recreational activities or species. | A comprehensive invasive and exotic plant species control program would be implemented and documented with the use of GPS and GIS. | Same as Alternative C. |

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|--|--|--|--|--|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife-Dependent Public Use |
| Resource Protection | | | | |
| Law Enforcement | | | | |
| Wheeler, Key Cave, Sauta Cave, and Fern Cave | Current levels of law enforcement are inadequate. | Additional law enforcement resources would be required to increase visitor safety. | Additional law enforcement resources would be required to increase resource protection. | Additional law enforcement resources would be required to increase public and resource protection. |
| Rights-of-Way and Encroachment | | | | |
| Wheeler | Refuge policy governing rights-of-way is used to manage easements and new easement requests. | Same as Alternative A. | Impacts of existing easements on refuge resources would be analyzed to determine if the current refuge policy should be altered. Coordination with local planning and zoning departments would be increased. | Same as Alternative C. |
| Land Acquisition | | | | |
| Wheeler | Options to protect lands outside the current refuge boundary within the lower reaches of Piney and Limestone Creeks would be explored. | Same as Alternative A. | Same as Alternative A. | Same as Alternative A. |

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|---|---|---|---|---|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife-Dependent Public Use |
| Key Cave | All lands within the approved acquisition boundary have been acquired by the Service. | Same as Alternative A. | Same as Alternative A. Options to protect lands outside the current refuge boundary within the high risk areas of the Key Cave water recharge zone would be explored. | Same as Alternative C. |
| Sauta Cave | All lands within the approved acquisition boundary have been acquired by the Service. | Same as Alternative A. | Same as Alternative A. | Same as Alternative A. |
| Fern Cave | Four hundred and eighty-three (483) acres within the approved acquisition boundary have not been acquired by the Service. | Same as Alternative A. | Complex management would focus acquisition efforts on acquiring the land that surrounds the fifth cave entrance (Surprise Pit). | Same as Alternative C. |
| Water Quality and Litter Control | | | | |
| Wheeler, Key Cave, Sauta Cave, and Fern Cave | Water quality information is limited or non-existent and litter control is only conducted when resources allow. | Same as Alternative A. | Complex-wide comprehensive water monitoring program and litter control/reduction programs would be developed. | Same as Alternative C. |

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|---|--|---|--|--|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife-Dependent Public Use |
| <i>Public Use Opportunities</i> | | | | |
| Hunting | | | | |
| Wheeler | White-tailed deer, feral hog, squirrel, rabbit, raccoon, opossum, and northern bobwhite are hunted on ≈ 18,000 acres within the State hunting season frame work. Regulations are updated each year within the current refuge hunting permit. | Same as Alternative A, except the number of days available for hunting would be increased by aligning the refuge hunting seasons with the State's seasons. Uplands surrounding Garth Slough would be examined for opportunities to lengthen the hunting dates and feral hogs would be hunted during both the small game and large game hunting seasons. | Same as Alternative A, except some areas currently open for hunting would be closed to provide protection to waterfowl from human disturbance. | Same as Alternative C, except the number of days available for small game hunting would be increased by adding two consecutive weekends for hunting. In addition, feral hogs would be hunted during both the small and large game hunting seasons. |
| Key Cave | Squirrel, rabbit, raccoon, opossum, dove, and northern bobwhite are hunted on 1,060 acres through a permitting program with the State's Seven Mile Island Wildlife Management Area. | Same as Alternative A, except hunting seasons would be aligned with State seasons and feral hogs would be added to the hunting permit. | Same as Alternative A. | Same as Alternative A, plus the hunting program would be evaluated annually. Results would dictate if the hunting program should be expanded, reduced or remain the same. |

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|--|---|--|--|---|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife-Dependent Public Use |
| Sauta Cave | Squirrel, rabbit, raccoon, opossum, deer, dove, and quail are hunted on 264 acres through a permitting program with the State's North Sauty Wildlife Management Area. | Same as Alternative A. | Same as Alternative A. | Same as Alternative A. |
| Fern Cave | Hunting is not allowed. | Hunting opportunities would be explored. | Same as Alternative A. | Same as Alternative B. |
| Fishing | | | | |
| Wheeler | Fishing on ≈ 11,250 surface acres of refuge waters are conducted in accordance with State regulations. Special regulations apply to posted areas. | Same as Alternative A, plus youth fishing opportunities would be increased by adding two (2) additional youth fishing rodeos annually. | Same as Alternative A, except bank fishing at night would be eliminated and boat access restrictions within Crabtree Slough would be expanded. | Boat access restrictions within Crabtree Slough would be expanded, areas available for night bank fishing would be slightly reduced and one (1) additional youth fishing rodeo would be conducted annually. |
| Fern Cave | Fishing along the banks of the Paint Rock River would continue in accordance with State regulations. | Same as Alternative A. | Same as Alternative A. | Same as Alternative A. |

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|---|--|--|---|--|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife-Dependent Public Use |
| Wildlife Observation and Photography | | | | |
| Wheeler | Current facilities and opportunities are maintained. | Same as Alternative A, plus three (3) additional observation towers, three (3) additional photo blinds, a wildlife viewing platform, and a wildlife drive (auto tour) would be constructed. | Same as Alternative A. | Same as Alternative B, except only one (1) additional observation tower and one (1) additional photo blind would be constructed. |
| Key Cave and Sauta Cave | Current facilities and opportunities are maintained. | Same as Alternative A, plus a photo blind would be constructed at each refuge. | Same as Alternative A. | Same as Alternative A, plus additional opportunities would be explored. |
| Fern Cave | Opportunities are limited but would be maintained. | Same as Alternative A. | Same as Alternative A. | Same as Alternative A, plus additional opportunities would be explored. |
| Environmental Education and Interpretation | | | | |
| Wheeler | On and off-refuge environmental education is provided to local schools and other groups. Existing interpretive signs on nature trails are maintained for interpretation. | Environmental education and interpretation would be increased by offering more off-site programs, updating displays and interpretive signs along nature trails, and constructing a new environmental education center. | Same as Alternative A. | Same as Alternative B, except off-site programs would remain limited to within 50 miles of the Wheeler Complex Headquarters. |

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|---|--|---|---|---|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife-Dependent Public Use |
| Key Cave, Sauta Cave, and Fern Cave | On- and off-refuge environmental education programs are not currently available. | Off-refuge environmental education programs would be offered and refuge informational brochures would be published. | Same as Alternative A. | Refuge informational brochures would be published. |
| Visitor Access | | | | |
| Wheeler | The refuge is currently open at night for public use. | Same as Alternative A. | All refuge lands would be closed at night to the public with the exception of (1) any night hunting as provided in the hunting permit; and (2) activities covered under a special use permit. | All refuge lands would be closed at night, with the exception of (1) access to designated boat launching facilities; (2) access to designated night bank fishing areas (fishing permit required); (3) any night hunting as provided in the hunting permit; and (4) activities covered under a special use permit. |

| Issues Raised During Scoping Listed by Refuge(s) | | How the issues were addressed? | | |
|--|---|--|--|---|
| Range of Alternatives | Alternative A: Current Management | Alternative B: Maximize Compatible Wildlife- Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use |
| <i>Refuge Administration</i> | | | | |
| Staffing Requirements | | | | |
| Wheeler, Key Cave, Sauta Cave, and Fern Cave | The Complex utilizes 16.0 FTEs to maintain and protect current refuge lands and programs. | An additional 12.0 FTEs would be required to maximize public use opportunities. | An additional 18.0 FTEs would be required to maximize wildlife/habitat programs. | An additional 19.0 FTEs would be required to balance public use and wildlife/habitat programs. |
| Maintenance/Facilities/Infrastructure | | | | |
| Wheeler, Key Cave, Sauta Cave, and Fern Cave | Maintenance levels are maintained to meet both public use and habitat management needs. | Maintenance on public use facilities, infrastructure, and programs would be maximized. | Maintenance on wildlife/habitat management facilities would be maximized. | Maintenance levels would be increased on both public use and wildlife/habitat management facilities. |

Chapter IV. Environmental Consequences

OVERVIEW

This section analyzes and discusses the potential environmental effects or consequences that can be reasonably expected by the implementation of each of the four alternatives described in Chapter III of this environmental assessment. For each alternative, the expected outcomes are portrayed through the 15-year life of the CCP. Implementation of any of the action alternatives (i.e., alternatives B, C, and D) is anticipated to have positive impacts to area land values, related employment and income, and outdoor recreational and environmental education opportunities.

EFFECTS COMMON TO ALL ALTERNATIVES

A few potential effects would be similar under each alternative and are summarized under seven categories: environmental justice; climate change; land acquisition; cultural resources; water quality, wetlands, and floodplains; aesthetics; visitor services; socioeconomic environment; refuge revenue sharing payments; public health and safety; and other management.

ENVIRONMENTAL JUSTICE

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

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

CLIMATE CHANGE

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

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

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

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

OTHER MANAGEMENT

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

LAND ACQUISITION

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

CULTURAL RESOURCES

The Fish and Wildlife Service is responsible for managing archaeological and historical sites found on refuge lands. Since cultural resource surveys on the refuge have been limited, additional surveys would be conducted prior to any new construction or excavation on refuge lands in order to fully satisfy provisions of the National Environmental Policy Act of 1969, and all applicable cultural resource laws and policies. Potentially negative impacts from construction of trails, impoundments, or facilities would require review by the Service’s Regional Archaeologist and consultation with the State Historic Preservation Office, as mandated by Section 106 of the National Historic Preservation Act. The Service’s policy is to preserve these cultural resources in the public trust and avoid any adverse effects wherever possible. Determining whether a particular management action has the potential to affect cultural resources is an on-going process that would occur during the detailed planning stages of every project.

Service acquisition of land with known or potential archaeological or historical sites provides three major types of protection for these resources – protection from private development (e.g., into single-family homes), protection from damage by Federal activities, and protection from vandalism or theft. Service policy is to preserve these resources in the public trust, avoiding impacts whenever possible.

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

REFUGE REVENUE SHARING PAYMENTS

Annual refuge revenue sharing payments to Jackson, Lauderdale, Limestone, Madison, and Morgan Counties would continue at similar rates under each alternative. If lands are acquired and added to an individual refuge, the payments would increase accordingly for the affected county or counties.

VISITOR SERVICES

Under any of the alternatives, the Service would consult with local and State officials and the public during detailed planning for and construction of any new facilities.

SOCIOECONOMIC ENVIRONMENT

Each of the alternatives is anticipated to positively impact socioeconomic factors of the surrounding communities. Although refuge properties do occupy lands that might provide income to the local tax base, those lost tax revenues are offset by enhanced property values on adjacent lands and improved aesthetics related to conservation lands and open space. And, conservation lands require less expenditure of local taxes to fund infrastructure and other services than required by developed lands.

REFUGE ADMINISTRATION

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

OTHER EFFECTS

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

SUMMARY OF EFFECTS BY ALTERNATIVE

The following section describes the environmental consequences of adopting each refuge management alternative. Each alternative is anticipated to result in either net neutral or net positive environmental benefits. Impacts under each alternative are summarized for soils; air quality; hydrology and water quality; and biological resources. Table 13 summarizes and addresses the likely outcomes for the specific issues, and is organized by broad issue categories.

ALTERNATIVE A: NO ACTION (CURRENT MANAGEMENT)

Implementation of Alternative A is anticipated to result in net neutral environmental benefits.

The management activities outlined under Alternative A are anticipated to have net neutral to positive impacts on soils.

The management activities outlined under Alternative A would help to improve air quality. Minor, short-term negative air quality impacts could be experienced during controlled burns or wildfires. However, these impacts are offset by the positive impacts of the resultant higher quality native habitats.

The management activities outlined under Alternative A are anticipated to have net positive impacts to hydrology and water quality. Minor restoration activities of impounded wetlands are anticipated to positively impact hydrology and water quality. Positive impacts would also result from the acquisition, protection, and management of additional lands.

The management activities outlined under Alternative A are anticipated to have net positive impacts to biological resources. Habitat management activities would result in high-quality habitats supporting native wildlife and wildlife diversity.

ALTERNATIVE B: MAXIMIZE COMPATIBLE WILDLIFE-DEPENDENT PUBLIC USE

Implementation of Alternative B is anticipated to result in net positive environmental benefits.

The management activities outlined under Alternative B are anticipated to have net positive impacts on soils. Restoring impounded wetlands and managing habitats would positively impact soils and soil formation processes.

The management activities outlined under Alternative B would help to improve air quality. Minor, short-term negative air quality impacts could be experienced during controlled burns or wildfires. However, these impacts are offset by the positive impacts of the resultant higher quality native habitats.

The management activities outlined under Alternative B are anticipated to have net positive impacts on hydrology and water quality. Restoration activities of impounded wetlands are anticipated to positively impact hydrology and water quality. Positive hydrology and water quality impacts would result from the acquisition, protection, and management of additional lands.

The management activities outlined under Alternative B are anticipated to have net positive impacts on biological resources. Habitat management activities would result in high-quality habitats supporting increased numbers of threatened and endangered species and native wildlife and wildlife diversity.

ALTERNATIVE C: MAXIMIZE WILDLIFE/HABITAT MANAGEMENT

Implementation of Alternative C is anticipated to result in net positive environmental benefits.

The management activities outlined under Alternative C are anticipated to have net positive impacts on soils. Improving habitat management, restoring impounded wetlands, and restoring natural habitats positively impact soils and soil formation processes.

The management activities outlined under Alternative C would help to improve air quality. Minor, short-term negative air quality impacts could be experienced during controlled burns or wildfires. However, these impacts are offset by the positive impacts of the resultant higher quality native habitats.

The management activities outlined under Alternative C are anticipated to have net positive impacts on hydrology and water quality. Restoration activities of impounded wetlands and native warm season grasslands are anticipated to positively impact hydrology and water quality. Positive hydrology and water quality impacts would result from the acquisition, protection, and management of additional lands.

The management activities outlined under Alternative C are anticipated to have net positive impacts on biological resources. Habitat management activities would result in high-quality habitats supporting increased numbers of migratory birds, threatened and endangered species, and native wildlife and wildlife diversity.

ALTERNATIVE D: BALANCE WILDLIFE/HABITAT MANAGEMENT AND COMPATIBLE WILDLIFE-DEPENDENT PUBLIC USE (PROPOSED ACTION)

Implementation of Alternative D is anticipated to result in net positive environmental benefits.

The management activities outlined under Alternative D are anticipated to have net positive impacts on soils. Managing habitats, restoring impounded wetlands, and restoring native warm season grasslands would positively impact soils and soil formation processes.

The management activities outlined under Alternative D would help to improve air quality. Minor, short-term negative air quality impacts could be experienced during controlled burns or wildfires. However, these impacts are offset by the positive impacts of the resultant higher quality native habitats.

The management activities outlined under Alternative D are anticipated to have net positive impacts on hydrology and water quality. Restoration activities of impounded wetlands and native grasslands are anticipated to positively impact hydrology and water quality. Positive hydrology and water quality impacts would result from the acquisition, protection, and management of additional lands.

The management activities outlined under Alternative D are anticipated to have net positive impacts on biological resources. Habitat management activities would result in high-quality habitats supporting increased numbers of migratory birds, threatened and endangered species, and native wildlife and wildlife diversity.

Table 13. Summary of environmental effects by alternative, Wheeler National Wildlife Refuge Complex

| Resource Affected | Alternative A (Current Management – No Action Alternative) | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use (Proposed Alternative) |
|---|--|--|--|---|
| Migratory and Resident Birds | | | | |
| Waterfowl (Ducks, Geese, and Cranes) | Neutral to Positive Impacts. Waterfowl populations and species diversity would not change substantially, modestly contributing to NAWMP habitat and population objectives. Most species would continue to benefit from current Complex management. | Negative Impacts. Would adversely affect populations due to disturbance from increased activity. | Neutral to Positive Impacts. Modest increase in waterfowl populations likely in response to increases in habitat and reduced disturbances. | Neutral to Positive Impacts. Populations may increase. Net effect may be neutral. |
| Waterbirds (Colonial Waterbirds, Marsh Birds, and Shorebirds) | Neutral to Positive Impacts. Waterbird populations expected to remain stable; most species would continue to benefit from current Complex management. | Neutral to Positive Impacts. Same as Alternative A. | Positive Impacts. Waterbird populations expected to increase somewhat with increased management and habitat restoration. | Positive Impacts. Same as Alternative C. |

| Resource Affected | Alternative A (Current Management – No Action Alternative) | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use (Proposed Alternative) |
|--|--|---|--|---|
| Landbirds (Forest Birds, Grassland Birds, and Scrub-Shrub Birds) | Neutral to Positive Impacts. Populations would be expected to remain stable and relatively low; most species would continue to benefit from current Complex management. | Neutral to Positive Impacts. Same as Alternative A. | Positive Impacts. Populations would be expected to increase with additional acreages of old field, grassland, and oak savanna habitat. | Positive Impacts. Same as Alternative C. |
| Other Resident Wildlife (Threatened, Endangered, and Imperiled Species) | | | | |
| Game Species | Neutral Impacts. Populations of game species are expected to remain at current levels. Limited monitoring. | Negative Impacts. Populations of game species are expected to decrease with increases in hunting. | Positive Impacts. Populations of game species are expected to increase with active management. | Positive Impacts. Same as Alternative C. |
| Amphibians & Reptiles | Neutral Impacts. Reptile and amphibian populations likely to remain stable. Limited amounts of baseline data are available to help determine population levels. Current management includes incidental management. | Neutral Impacts. Same as Alternative A. | Positive Impacts. Reptile and amphibian populations expected to increase with active management. Information from inventories and assessments of current populations expected to have a positive effect for future planning. | Positive Impacts. Same as Alternative C. |

| Resource Affected | Alternative A (Current Management – No Action Alternative) | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use (Proposed Alternative) |
|---|---|--|--|---|
| Control of Invasive/ Nuisance Animals (Feral Hogs and Beavers) | Negative Impacts. Populations of feral hogs would likely increase at Wheeler and Key Cave NWRs and the beaver population at Wheeler NWR would likely increase. | Neutral Impacts. Populations of feral hogs would likely decrease but the beaver population would likely increase. | Positive Impacts. Populations of feral hogs and beavers would likely decrease. | Positive Impacts. Same as Alternative C. |
| Gray and Indiana Bats | Neutral Impacts. Bat populations would likely remain stable with current protection. | Neutral Impacts. Same as Alternative A. | Neutral to Positive Impacts. Bat populations may increase slightly. | Neutral to Positive Impacts. Same as Alternative C. |
| Alabama cavefish | Unknown Impacts. Alabama cavefish population trends would remain unknown. | Unknown Impacts. Same as Alternative A. | Neutral to Positive Impacts. Alabama cavefish population trends may be determined. | Neutral to Positive Impacts. Same as Alternative C. |
| Mussels | Neutral Impacts. Mussel populations likely to remain stable. | Neutral Impacts. Same as Alternative A. | Neutral to Positive Impacts. Mussel populations may increase slightly. | Neutral Impacts. Same as Alternative A. |
| Snails | Neutral Impacts. Snail populations likely to remain stable. | Neutral Impacts. Same as Alternative A. | Neutral to Positive Impacts. Snail populations may increase slightly. | Neutral Impacts Same as Alternative C. |

| Resource Affected | Alternative A (Current Management – No Action Alternative) | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use (Proposed Alternative) |
|---|--|--|--|---|
| Habitats and Plants of Interest | | | | |
| Impoundments and Shallow Water Areas (including Moist Soil) | Neutral Impacts. Current levels of management and maintenance would continue providing modest habitat for waterfowl. | Positive Impacts. Same as Alternative A. | Positive Impacts. Levels of management and maintenance would increase providing improved habitat for waterfowl. | Positive Impacts. Levels of management and maintenance would slightly increase. |
| Croplands for Waterfowl and Wildlife | Neutral Impacts. Areas, acreages, and crops cultivated would not change. | Negative Impacts. Acreages would decrease and crops cultivated would not change, however areas planted would be altered. | Negative Impacts. Acreages would decrease and crops cultivated would not change. | Neutral to Positive Impacts. Same as Alternative A. |
| Old Fields | Neutral Impacts. Current acreages would be maintained. | Positive Impacts. Old Field habitat would increase in area and abundance. | Positive Impacts. Same as Alternative B. | Neutral to Positive Impacts. Same as Alternative A, plus additional acreages would be planted in select areas. |
| Grasslands (Native Warm Season Grasses) | Neutral Impacts. Current acreages would be maintained. | Positive Impacts. Grasslands habitat would increase in area and abundance. | Positive Impacts. Same as Alternative B. | Neutral to Positive Impacts. Same as Alternative A, plus additional acreages would be planted in select areas. |

| Resource Affected | Alternative A (Current Management – No Action Alternative) | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use (Proposed Alternative) |
|---------------------------------------|---|---|--|---|
| Bottomland Hardwood Forests | Neutral Impacts. Current levels of acreages would be maintained. | Neutral Impacts. Same as Alternative A. | Positive Impacts. Forest management for birds would create healthier forests. | Positive Impacts. Same as Alternative C. |
| Oak Savanna Forests | Neutral Impacts. Current acreages would be maintained. | Neutral Impacts. Same as Alternative A. | Positive Impacts. Acreages would increase. | Positive Impacts. Same as Alternative C. |
| Open Water, Marsh, Creeks and Sloughs | Negative Impacts. Acreage would not change, but habitat quality would change due to sedimentation and invasive aquatic plant species would continue to proliferate. | Negative Impacts. Same as Alternative A. | Neutral to Positive Impacts. Acreage would not change, but quality may improve with increased land protection and increased invasive aquatic species management. | Neutral to Positive Impacts. Same as Alternative C. |
| Hydric Drains or Swamps | Neutral Impacts. Acreage and habitat quality would not change. | Neutral Impacts. Same as Alternative A. | Neutral to Positive Impacts. Acreage would not change, but habitat quality may improve with increased land protection and increased invasive aquatic species management. | Neutral to Positive Impacts. Same as Alternative C. |

| Resource Affected | Alternative A (Current Management – No Action Alternative) | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use (Proposed Alternative) |
|--|--|---|---|---|
| American Hart's-tongue fern | Negative Impacts. Active management of American Hart's tongue fern populations lacking. | Negative Impacts. Same as Alternative A. | Positive Impacts. American Hart's-tongue fern populations may increase with increase in protection and management. | Positive Impacts. Same as Alternative C. |
| Price's potato-bean | Neutral Impacts. Price's potato-bean populations likely to remain stable. | Neutral Impacts. Same as Alternative A. | Neutral to Positive Impacts. Price's potato-bean populations may increase with increase in forest management. | Neutral to Positive Impacts. Same as Alternative C. |
| Resource Threats | | | | |
| Control of Invasive Plant Species | Negative Impacts. Both aquatic and terrestrial invasive plant species remain problematic; control efforts are limited. | Negative Impacts. Invasive plant species would be expected to increase at an alarming rate. | Positive Impacts. Under a comprehensive and well-funded control program; invasive plants are identified and controlled or eradicated. Habitats would improve. | Positive Impacts. Same as Alternative C. |
| Contaminants (in water, sediments, fish) | Neutral to Negative Impacts. Contaminant issues would be expected to stay the same or increase. | Neutral to Negative Impacts. Same as Alternative A. | Neutral to Positive Impacts. Extent of problem would be more closely assessed and monitored, and if needed, addressed. | Neutral to Negative Impacts. Same as Alternative C. |

| Resource Affected | Alternative A (Current Management – No Action Alternative) | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use (Proposed Alternative) |
|--|--|---|---|---|
| Siltation | Negative Impacts. Would likely stay the same or increase. | Negative Impacts. Same as Alternative A. | Neutral to Positive Impacts. May decrease due to increase in soil conservation measures. | Neutral to Positive Impacts. Same as Alternative C. |
| Urbanization (including rights-of-way and easements) | Negative Impacts. Urbanization problems would continue to increase as populations of nearby cities continue to grow at an alarming rate. | Negative Impacts. Same as Alternative A. | Neutral to Negative Impacts Some urbanization and encroachment problems or issues may be avoided by developing partnerships with local planning and zoning departments. | Neutral to Positive Impacts. Same as Alternative C. |
| Land Protection | | | | |
| Land Acquisition | Neutral to Negative Impacts. Four hundred and eighty-three (483) acres within the approved acquisition boundary for Fern Cave NWR have not been acquired by the Service. | Neutral to Negative Impacts. Same as Alternative A. | Positive Impacts. Complex management would focus acquisition efforts on acquiring the land that surrounds the fifth cave entrance (Surprise Pit) at Fern Cave NWR. | Positive Impacts. Same as Alternative C. |

| Resource Affected | Alternative A (Current Management – No Action Alternative) | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use (Proposed Alternative) |
|--|--|---|--|---|
| Farmer Service Agency Conservation Easements | Neutral to Positive Impacts. Continue limited management of five tracts for habitat, game species, and nongame species. | Neutral to Positive Impacts. Same as Alternative A. | Neutral to Positive Impacts. Same as Alternative A. | Neutral to Positive Impacts. Same as Alternative A. |
| Partners, Volunteers, Friends Group, and Interns | Positive Impacts. Maintain and increase as approached by interested partners. | Positive Impacts. Same as Alternative A. | Positive Impacts. Same as Alternative A. | Positive Impacts. Same as Alternative A. |
| Private Lands | Positive Impacts. Assistance to and cooperation with neighboring private landowners would continue. | Positive Impacts. Same as Alternative A. | Positive Impacts. Same as Alternative A. | Positive Impacts. Same as Alternative A. |
| Litter Control | Negative Impacts. Litter problems would continue as control and reduction of trash would only occur when budgets and work force availability would allow. | Negative Impacts. Litter problems would continue to increase with more people using Complex lands and the increase in population of local communities. | Positive Impacts. Litter problems would decrease with the addition of a comprehensive litter control and reduction program. | Positive Impacts. Same as Alternative C. |

| Resource Affected | Alternative A (Current Management – No Action Alternative) | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use (Proposed Alternative) |
|--------------------------|--|--|---|--|
| Law Enforcement | Negative Impacts. Current levels of enforcement and protection are maintained. | Positive Impacts. Increase in protection of visitor safety with little to no impact on resource management and maintenance programs would occur. | Positive Impacts. Increase in protection of resources with little to no impact on resource management and maintenance programs would occur. | Positive Impacts. Increase in protection of resources and visitor safety with little to no impact on resource management and maintenance programs would occur. |
| Cultural Resources | Positive Impacts. Current levels of cultural resource protection are maintained. Partnerships with Redstone Arsenal and TVA are maintained to increase awareness and protection. | Positive Impacts. Same as Alternative A. | Positive Impacts. Same as Alternative A. | Positive Impacts. Same as Alternative A. |
| Public Use | | | | |
| Hunting | Neutral Impacts. Hunting opportunities are maintained at current levels. | Neutral to Positive Impacts. Hunting opportunities for small game and feral hogs would be increased. | Positive Impacts. Hunting opportunities for feral hogs would be increased. | Neutral to Positive Impacts. Same as Alternative B. |

| Resource Affected | Alternative A (Current Management – No Action Alternative) | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use (Proposed Alternative) |
|--|--|--|--|---|
| Fishing | Neutral Impacts. Fishing opportunities are maintained at current levels. | Neutral to Positive Impacts. Fishing opportunities would be increased. | Neutral to Positive Impacts. Fishing opportunities at night may decrease due to night time closure of many parts of Wheeler NWR. | Neutral to Positive Impacts. Fishing opportunities at night may decrease due to night time closure of many parts of Wheeler NWR. Youth fishing events would increase. |
| Environmental Education and Interpretation | Positive Impacts. Environmental education and interpretation levels would continue. | Positive Impacts. Environmental education and interpretation would be expanded through an increase in on-site and off-site activities, programs, and facilities. | Positive Impacts Same as Alternative A. | Positive Impacts Same as Alternative B. |
| Wildlife Observation and Photography | Positive Impacts. Wildlife observation and photography opportunities are maintained. | Positive Impacts. Increased opportunities for wildlife observation and photography would occur. | Positive Impacts. Same as Alternative A. | Positive Impacts. Same as Alternative B. |
| Visitor Access | Neutral to Positive Impacts. Current levels of access for visitors are maintained. | Positive Impacts. Visitor access would be increased. | Negative Impacts. Visitor access would be decreased at night and in waterfowl sanctuary areas. | Neutral to Negative Impacts. Visitor access would be slightly decreased. |

| Resource Affected | Alternative A (Current Management – No Action Alternative) | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use (Proposed Alternative) |
|--|--|--|--|---|
| Lack of Awareness and Visitation by Nearby Residents and Communities | Neutral to Positive Impacts. Current levels of awareness and visitation maintained. | Positive Impacts. Awareness, understanding, and visitation would be increased with new facilities, environmental education outreach, exhibits, trails, and other opportunities for the public. | Positive Impacts. Same as Alternative A. | Positive Impacts. Same as Alternative B. |
| Complex Administration | | | | |
| Facilities | Neutral to Negative Impacts. Current facilities and level of maintenance are maintained. | Positive Impacts. A new environmental education center would increase the ability to provide the public with a satisfying and educational experience. | Neutral to Negative Impacts. Same as Alternative A. | Positive Impacts. Same as Alternative B. |
| Other Human Dimensions | | | | |
| Human Health and Safety | Neutral Impacts. Acceptable, typical risks to visitors, motorists, and nearby residents from accidents and wildfires would continue. | Neutral to Negative Impacts. Same as Alternative A, expect an increase in visitors may lead to an increase in incidents. | Neutral Impacts. Same as Alternative A. | Neutral to Negative Impacts. Same as Alternative A. |

| Resource Affected | Alternative A (Current Management – No Action Alternative) | Alternative B: Maximize Compatible Wildlife-Dependent Public Use | Alternative C: Maximize Wildlife/Habitat Management | Alternative D: Balance Wildlife/Habitat Management with Compatible Wildlife- Dependent Public Use (Proposed Alternative) |
|--------------------------|--|--|--|---|
| Socioeconomic Effects | Positive Impacts. Modest beneficial socioeconomic impacts on surrounding communities would continue to be generated from spending, incomes, taxes, refuge revenue sharing, and visitation/tourism, as well as assistance to local farmers for cooperative farming. | Neutral to Negative Impacts. Modest beneficial socioeconomic impacts on surrounding communities would continue to be generated from spending, incomes, taxes, refuge revenue sharing, and visitation/tourism. However, local farmers would lose income from eliminating the cooperative farming program. | Negative Impacts. Modest decrease in socio-economic benefits to surrounding communities. | Positive to Neutral Impacts. Same as Alternative A, except farming benefit may decline due to more contract / force account farming. |

UNAVOIDABLE IMPACTS AND MINIMIZATION MEASURES

Under Alternative A—the No-Action Alternative—there are numerous unavoidable impacts, including law enforcement that is not adequate for protecting both natural resources and visitor safety; continued degradation of the biological functions of native plant communities and wildlife habitat due to the invasion of exotic plants and nuisance animals; and a continued decrease in biodiversity. Over time, if these issues are not addressed, they would continue to impact resources on each refuge in the Wheeler Complex.

Alternative D, the proposed alternative, also has some unavoidable impacts. These impacts are expected to be minor and/or short-term in duration. However, the Complex would attempt to minimize these impacts whenever possible. The following section describes the measures the Complex would employ to mitigate and minimize the potential impacts that would result from implementation of the proposed alternative.

WATER QUALITY FROM SOIL DISTURBANCE AND USE OF HERBICIDES

Soil disturbance and siltation due to water management activities; road and levee maintenance; farming; the construction of observation towers, boat ramps, and nature trails; and the rehabilitation of the headquarters administrative building and the Visitors Center are expected to be minor and of short duration. To further reduce potential impacts to water, the Complex would use best management practices to minimize the erosion of soils into water bodies.

Foot traffic on new and/or extended nature trails is expected to have a negligible impact on soil erosion. To minimize the impacts of soil erosion on nature trails, the Complex would install informational signs that request nature trail users to remain on the trails, in order to reduce potential erosion problems.

Long-term herbicide use for exotic/invasive plant control could result in a slight decrease in water quality in areas prone to exotic/invasive plant infestation. Through the proper application of herbicides, however, this is expected to have a minor impact on the environment, with the benefit of reducing or eliminating exotic/invasive plant infestations, resulting in net positive benefits.

WILDLIFE DISTURBANCE

Disturbance to wildlife is an unavoidable consequence of any public use program, regardless of the activity involved or the location in which the activity occurs. While some activities, such as wildlife observation and wildlife photography, may be less disturbing than others, all of the public use activities outlined under the proposed alternative would be planned to avoid unacceptable levels of impact.

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

VEGETATION DISTURBANCE

Negative impacts could result from the creation, extension, and maintenance of nature trails that require the clearing of nonsensitive vegetation along their length. This is expected to be a minor short-term impact.

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

USER GROUP CONFLICTS

As public use increases, unanticipated conflicts between different user groups could occur. If this should happen, the Complex would adjust its programs, as needed, to eliminate or minimize any public use issues. The Complex would use methods that have proven to be effective in reducing or eliminating public use conflicts. These methods include establishing separate use areas; different use periods; and limits on the numbers of users, in order to provide safe, quality, appropriate, and compatible wildlife-dependent recreational opportunities.

EFFECTS ON ADJACENT LANDOWNERS

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

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

LAND OWNERSHIP AND SITE DEVELOPMENT

Land acquisition efforts by the Service could lead to changes in land use and recreational use patterns. However, most of the non-Service-owned lands within the approved acquisition boundary of Fern Cave NWR are currently undeveloped. If these lands are acquired as additions to Fern Cave NWR, they would be maintained in a natural state, managed for native wildlife populations, and opened to appropriate and compatible wildlife-dependent public uses, where feasible.

Since all of the approved acquisition boundaries for the other refuges in the Wheeler Complex have been acquired, any additional expansions would have to be conducted through a Minor Expansion Proposal, a Land Protection Plan, or a change in Service policy. As with the case at Fern Cave NWR, any lands acquired as additions would be maintained in a natural state, managed for native wildlife populations, and opened to appropriate and compatible wildlife-dependent public uses, where feasible.

Potential development of the Complex's buildings, trails, and other improvements could lead to minor short-term negative impacts on plants, soils, and some wildlife species. When building the observation towers, efforts would be made to use recycled products and environmentally sensitive treated lumber. The Visitor Center would be maintained to be aesthetically pleasing to the community and to avoid any additional impacts to native plant communities. All construction activities would comply with the requirements of Section 404 of the Clean Water Act; the National Historic Preservation Act; Executive Order 11988, Floodplain Management; and other applicable regulatory requirements.

CUMULATIVE IMPACTS

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

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

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

Under the proposed action, environmental education would receive increasing emphasis both on and off-refuge lands. These enhanced efforts would likely lead to a concomitant cumulative, beneficial impacts on the level of environmental knowledge and awareness in the citizens of northern Alabama. In addition, increased cooperation with local governments, the implementation of a contaminants monitoring and prevention program, and the development of a comprehensive invasive species control program would result in fewer negative cumulative impacts to the environment. Furthermore, increased public use activities on the refuges would cumulatively result in increased demand for water, electricity, roads, lodging and other infrastructure. The combined impacts of all these activities would affect the surrounding communities and the ability of the local government to provide services. Similarly, other human activities such as farming must use best management practices to minimize negative cumulative effects on water quality in the Tennessee River Valley.

Implementation of any of the four alternatives described in this Final Environmental Assessment, including actions relating to site development, fish and wildlife habitat and population management, and recreational use programs, would have both direct and indirect effects. However, the Wheeler Complex staff does not expect the cumulative effects of these actions over the 15-year period of this plan to be significant.

DIRECT AND INDIRECT EFFECTS OR IMPACTS

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

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

Other indirect effects that may result from implementing the proposed alternative include minor impacts from siltation due to the disturbance of soils and vegetation while expanding and rehabilitating the water control structures, as well as expanding or creating new nature trails; construction of the observation tower and the new environmental education center; and providing greater visitor access through improvements to the road network and boat launching facilities.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

The habitat protection and management actions outlined under the proposed alternative are dedicated to maintaining the long-term productivity of refuge habitats. The benefits of this plan for long-term productivity far outweigh any impacts from short-term actions, such as the construction of observation towers and an environmental education center or the maintenance of roads. While these activities would cause short-term negative impacts, the educational values and associated public support gained from the improved visitor experience would produce long-term benefits for the entire Lower Tennessee-Cumberland Ecosystem.

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

Chapter V. Consultation and Coordination

OVERVIEW

The Wheeler National Wildlife Refuge (NWR) Complex Comprehensive Conservation Plan (CCP) and Final Environmental Assessment (EA) have been written with the participation of Service staff, refuge visitors, governmental partners, the local community, non-profit organizations, and the general public. The Tennessee Valley Authority (TVA) participated as a cooperating agency in the development of this Final EA. This chapter summarizes the consultation and coordination that has occurred to date in identifying the issues, developing alternatives, and choosing the proposed alternative, which are presented in the CCP. It lists the various agencies, organizations, and individuals who were consulted in the preparation of these documents.

A core writing team and a planning team led the process, a biological and habitat review team helped develop wildlife and habitat needs, a visitor service team helped develop public use needs, and the public contributed to the process during the scoping period. Please refer to Section A, Chapter III and Appendix D of this CCP for more information and a description of public involvement and input into this planning process.

CORE PLANNING TEAM MEMBERS

The core planning team consisted of select members from the Wheeler NWR Complex staff. This team served as the primary authors and editors of this document. The team members included:

- John Beck, Natural Resource Planner
- Emery Hoyle, Deputy Project Leader
- Bill Gates, Refuge Biologist
- Steve Seibert, Assistant Refuge Manager
- Teresa Adams, Supervisory Public Use Specialist

PLANNING TEAM MEMBERS

The planning team consisted of key members from the Complex staff and select individuals from the Alabama Division of Wildlife and Freshwater Fisheries (ADWFF), Redstone Arsenal Military Base, and TVA. Initially, this team focused on identifying issues and concerns pertinent to Complex management. The planning team held its initial meeting on July 28, 2005, to develop a vision, outline management goals, and provide direction for organizing public meetings. This team met on several occasions from July 2005 through February 2006. Additional tasks of the team involved refining the vision; reviewing and filtering issues; redefining the goals; and outlining the alternatives. The team members included:

- Dwight Cooley, Project Leader, Wheeler NWR Complex
- Emery Hoyle, Deputy Project Leader, Wheeler NWR Complex
- John Beck, Natural Resource Planner, Wheeler NWR Complex
- Bill Gates, Refuge Biologist, Wheeler NWR Complex
- Steve Seibert, Assistant Refuge Manager, Wheeler NWR Complex
- Teresa Adams, Supervisory Public Use Specialist, Wheeler NWR, Complex

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- Ron Eakes, Supervisory Wildlife Biologist, Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries
 - Keith Hudson, Non-game Biologist, Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries
 - Jeff Garner, Supervisor, Mussel Management, Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries
 - Keith McCutcheon, Supervisory Wildlife Biologist, Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries
 - Danny Dunn, Chief, Cultural and Natural Resources Branch, Directorate of Public Works, Redstone Arsenal Military Base
 - Rob Hurt, Fish and Wildlife Biologist, Ecological Services, Fish and Wildlife Service
 - J. Ralph Jordan, Process Specialist for Resource Management and Recreation, Tennessee Valley Authority

BIOLOGICAL AND HABITAT REVIEW TEAM MEMBERS

Preplanning activities for the CCP development began with a biological and habitat review in September 2002. The biological review team, comprised of a diverse group of experts from State and Federal agencies and non-profit organizations, was invited to review the biological programs for the Wheeler Complex. The invited participants included both local and regional experts, researchers, and individuals with intimate knowledge of and expertise in the biological resources of the Wheeler Complex. The objective of this team was to provide input regarding the best ways to manage and conserve Wheeler Complex's natural resources by conducting a critical examination of all aspects of the biological and habitat programs. Members of this team produced a final report that summarized their recommendations to be considered while developing the CCP for the Wheeler Complex. Members of the review team included:

- Frank Bowers, Chief, Division of Migratory Birds, Fish and Wildlife Service
- Frank Dukes, Manager, Eufaula NWR, (former Deputy Project Leader Wheeler NWR)
- Chuck Hunter, Chief, Division of Planning and Resource Management, Fish and Wildlife Service
- Rob Kelsey, Fish and Wildlife Biologist, Division of Resource Management, Fish and Wildlife Service
- Don Orr, Migratory Bird Field Coordinator, Wildlife and Habitat Management Office, Fish and Wildlife Service
- Keith Hudson, Non-game Biologist, Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries
- Scott Atkins, Regional Biologist, Resource Stewardship, Tennessee Valley Authority
- Jeff Garner, Supervisor, Mussel Management, Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries
- Keith McCutcheon, Supervisory Wildlife Biologist, Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries
- Danny Dunn, Chief, Cultural and Natural Resources Branch, Directorate of Public Works, Redstone Arsenal Military Base
- Keith Tassin, Director of Stewardship, The Nature Conservancy of Alabama

VISITOR SERVICES REVIEW TEAM MEMBERS

Preplanning activities continued with a visitor services (public use) review in October 2003. The Visitor Services Team (Table 15), consisting of public use specialists, made recommendations about the best ways to provide the public with opportunities to enjoy appropriate and compatible wildlife-dependent activities and facilities to help bring these activities to fruition. The team was comprised of Wheeler Complex staff, staff from other Region 4 refuges, and a Regional Office representative from the Visitor Services and Outreach program. This group reviewed the existing public use programs, facilities, and opportunities that are available on the Wheeler Complex. Emphasis was placed on the priority six wildlife-dependent public uses. A Public Use Review Report that provided recommendations for the short- and long-term public use program was developed and recommendations were taken into consideration in the development of the CCP.

- Gary Tucker, Regional Chief of Visitor Services, Fish and Wildlife Service
- Joan Stevens, Supervisory Park Ranger, Tennessee NWR
- Kathy Whaley, Deputy Refuge Manager, Alligator River NWR
- Mike Esters, Refuge Manager, Bayou Cocodrie NWR

In addition, to the planning teams, the Service sought the contributions of experts from various fields to assist the development of this CCP. Their recommendations provided valuable information for the authors of this plan.

- Jason Duke, GIS Specialist, Ecological Services, Fish and Wildlife Service
- Darrin Speegle, Law Enforcement Officer, Wheeler NWR
- Jason Vehrs, Law Enforcement Officer, Wheeler NWR
- Mike Dawson, Senior Planner, Fish and Wildlife Service
- Richard Kanaski, Regional Archaeologist, Fish and Wildlife Service
- Pete Tuttle, Contaminants Specialist, Ecological Services, Fish and Wildlife Service

SECTION C. APPENDICES

Appendix A. Glossary

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| Adaptive Management: | Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in management plan. Analysis of results help managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions. |
| Alluvial: | Sediment transported and deposited in a delta or riverbed by flowing water. |
| Alternative: | 1. A reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2). 2. Alternatives are different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission, and resolving issues (Service Manual 602 FW 1.6B). |
| Aquifer: | An underground bed or layer of earth, gravel, or porous stone that yields water. |
| Biological Diversity: | The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (USFWS Manual 052 FW 1. 12B). The system's focus is on indigenous species, biotic communities, and ecological processes. Also referred to as biodiversity. |
| Buffer: | A multi-use transitional area designed and managed to protect core reserves and critical corridors from increased development and human activities that are incompatible with habitat and/or wildlife values. In this document, agricultural lands are also considered buffer lands. |
| Carrying Capacity: | The maximum population of a species able to be supported by a habitat or area. |
| Categorical Exclusion (CE, CX, CATEX, CATX): | A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4). |
| CFR: | Code of Federal Regulations. |
| Colluvium: | A loose deposit of rock debris accumulated through the action of gravity. |

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| Compatible Use: | A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purpose(s) of the national wildlife refuge [50 CFR 25.12 (a)]. A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility. |
| Comprehensive Conservation Plan (CCP): | A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purposes of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System; and meets other mandates (Service Manual 602 FW 1.6 E). |
| Concern: | See Issue |
| Conservation Easement: | A legal agreement between a landowner and a land trust (a private, nonprofit conservation organization) or government agency that permanently limits a property's uses in order to protect its conservation value. |
| Cooperative Agreement: | A legal instrument used when the principle purpose of the transaction is the transfer of money, property, services or anything of value to a recipient in order to accomplish a public purpose authorized by Federal statute. |
| Cover Type: | The present vegetation of an area. |
| Cultural Resource Inventory: | A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7). |

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| Cultural Resource Overview: | A comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field offices background or literature search described in Section VIII of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7). |
| Cultural Resources: | The remains of sites, structures, or objects used by people in the past. |
| Designated Wilderness Area: | An area designated by the United States Congress to be managed as part of the National Wilderness Preservation System (Draft Service Manual 610 FW 1.5). |
| Disturbance: | Alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., aircraft overflight). |
| Ecosystem: | A dynamic and interrelating complex of plant and animal communities and their associated non-living environment. |
| Ecosystem Management: | Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely. |
| Endangered Species (Federal): | A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range. |
| Endangered Species (State): | A plant or animal species in danger of becoming extinct or extirpated in the State within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree. |
| Environmental Assessment (EA): | A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an Environmental Impact Statement or Finding of No Significant Impact (40 CFR 1508.9). |

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| Environmental Impact Statement (EIS): | A detailed written statement required by Section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11). |
| Feral: | A wild, free-roaming domestic animal which has become established as a breeding population. |
| Finding of No Significant Impact (FONSI): | A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a Federal action will have no significant effect on the human environment and for which an Environmental Impact Statement, therefore, will not be prepared (40 CFR 1508.13). |
| Geographic Information System (GIS): | A computer-based system for the collection, processing, and managing of spatially referenced data. GIS allows for the overlay of many data layers and provides a valuable tool for addressing resource management issues. |
| Goal: | Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Service Manual 620 FW 1.6J). |
| Habitat: | Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives. |
| Habitat Restoration: | Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy ecosystems. |
| Habitat Type: | See Vegetation Type. |
| Hydric: | A term used to define a habitat based on soil moisture conditions. Hydric habitats are those which regularly flood for at least a portion of a typical year. |
| Hydrology: | The scientific study of the properties, distribution, and effects of water in the atmosphere, on the earth's surface, and in soil and rocks. |
| Karst: | A geological term for an area of limestone formations characterized by sinkholes and underground streams. |
| In-holding: | Privately owned land inside the boundary of the refuge. |

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| Invasive exotic species: | Non-native species which have been introduced into an ecosystem, and, because of their aggressive growth habits and lack of natural predators, displace native species. |
| Improvement Act: | The National Wildlife Refuge System Improvement Act of 1997. |
| Issue: | Any unsettled matter that requires a management decision, e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or other presence of an undesirable resource condition (Service Manual 602 FW 1.6K). |
| Listed species: | Any species of fish, wildlife, or plant that has been determined to be “at risk” by a State or the Federal Government. |
| Malacologist: | A person who studies the science which relates to the structure and habitat of mollusks. |
| Management Alternative: | See Alternative |
| Management Concern: | See Issue |
| Management Opportunity: | See Issue |
| Marshbirds: | A term that encompasses non-colonial, non-waterfowl aquatic species, including loons, bitterns, non-colonial grebes, rails, gallinules, coots, limpkin and cranes. They are often secretive and feed primarily in fresh waters. |
| Memorandum of Understanding: | A voluntary agreement between two partnering agencies. |
| Mesic: | Pertaining to habitat requiring moderate amounts of moisture in the soil. Moisture is readily available for use by vegetation and the sites may flood in short duration. |
| Migration: | The seasonal movement from one area to another and back. |
| Mission Statement: | Succinct statement of the unit’s purpose and reason for being. |
| Monitoring: | The process of collecting information to track changes of selected parameters over time. |

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| National Environmental Policy Act of 1969 (NEPA): | Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (40 CFR 1500). |
| National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57): | Under the Improvement Act, the Fish and Wildlife Service is required to develop 15-year comprehensive conservation plans for all national wildlife refuges. The Act also describes the six public uses given priority status within the National Wildlife Refuge System (i.e., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation). |
| National Wildlife Refuge System Mission: | The mission is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. |
| National Wildlife Refuge System: | Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters, and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; games ranges; wildlife management areas; or waterfowl production areas. |
| National Wildlife Refuge: | A designated area of land, water, or an interest in land or water within the Refuge System. |
| Native Species: | Species that normally live and thrive in a particular ecosystem. |
| Neotropical migratory birds: | Birds that migrate from North America back and forth to South or Central America. These birds usually breed in the United States or Canada and “winter” in Mexico, the Caribbean, or Central or South America. |
| Noxious Weed: | A plant species designated by Federal or State law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States, according to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health. |

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| Objective: | A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Making objectives attainable, time-specific, and measurable (Service Manual 602 FW 1.6N). |
| Partnership: | A mutually beneficial, joint relationship between two or more entities (e.g., two agencies or an agency and a landowner). |
| Petroglyphs: | A carving or line drawing on rock, especially one made by prehistoric people. |
| Plant Association: | A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community. |
| Plant Community: | An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site, such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; and denotes a general kind of climax plant community. |
| Prescribed Fire: | The application of fire to wildland fuels to achieve identified land use objectives (Service Manual 621 FW 1.7). May be from natural ignition or intentional ignition. |
| Priority Species: | Fish and wildlife species that require protective measures and/or management guidelines to ensure their perpetuation. Priority species include the following: (1) state-listed and candidate species; (2) species or groups of animals susceptible to significant population declines within a specific area or statewide by virtue of their inclination to aggregate (e.g., seabird colonies); and (3) species of recreation, commercial, and/or tribal importance. |
| Public Involvement Plan: | Broad long-term guidance for involving the public in the comprehensive planning process. |
| Public Involvement: | A process that offers impacted and interested individuals and organizations an opportunity to become informed about, and to express their opinions on Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management. |

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| Public: | Individuals, organizations, and groups; officials of Federal, State, and local government agencies; Native American tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in Service issues and those who do or do not realize that Service decisions may affect them. |
| Purposes of the Refuge: | “The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge sub-unit.” For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge (Service Manual 602 FW 106 S). |
| Recommended Wilderness: | Areas studied and found suitable for wilderness designation by both the Director of the Fish and Wildlife Service and Secretary of the Department of the Interior, and recommended for designation by the President to Congress. These areas await only legislative action by Congress in order to become part of the Wilderness System. Such areas are also referred to as “pending in Congress” (Draft Service Manual 610 FW 1.5). |
| Record of Decision (ROD): | A concise public record of decision prepared by the Federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2). |
| Refuge Goal: | See Goal. |
| Refuge Operating Needs System (RONS): | 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: | See Purposes of the Refuge |
| Service Asset Maintenance and Management Systems (SAMMS): | A national database and accounting system used by refuges to document expenditures for the maintenance and management of facilities and equipment. |

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| Shorebirds: | Any of a large group of birds commonly called sandpipers and plovers, but also including others, such as gulls, terns, skimmers, oystercatchers, avocets, and stilts. Typically found along the shorelines of oceans, rivers, and lakes, they are commonly characterized by long bills, legs, and toes. |
| Songbirds: (Also Passerines) | A category of birds that is medium to small, perching landbirds. Most are territorial singers and migratory. |
| Step-down Management Plan: | A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives (Service Manual 602 FW 1.6 U). |
| Strategy: | A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.6 U). |
| Study Area: | The area reviewed in detail for wildlife, habitat, and public use potential. For purposes of this CCP/EA, the study area includes the lands within the currently approved refuge boundary and potential refuge expansion areas. |
| Threatened Species (Federal): | Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range. |
| Threatened Species (State): | A plant or animal species likely to become endangered in the State within the near future if factors contributing to population decline or habitat degradation or loss continue. |
| Trust Resources | Trust resources are those resources for which the Service has been given specific responsibilities under Federal law. These include migratory birds, interjurisdictional fishes (fish species that may cross State lines), federally listed threatened or endangered species, some marine mammals, and lands owned by the Service. |
| U.S. Fish and Wildlife Service Mission: | The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. |
| Vegetation Type, Habitat Type, Forest Cover Type: | A land classification system based upon the concept of distinct plant associations. |

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| Vision Statement: | A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates. We will tie the vision statement for the refuge to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates (Service Manual 602 FW 1.6 Z). |
| Wading birds: | Long-legged birds that wade in fresh or brackish water in search of food, including herons, egrets, bitterns, ibis, storks, spoonbills, flamingos, and cranes. |
| Waterfowl: | Ducks, geese, and coots. |
| 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 do support under natural conditions, plants and animals that require saturated or seasonally saturated soils. |
| Wilderness Study Areas: | Lands and waters identified through inventory as meeting the definition of wilderness and undergoing evaluation for recommendation for inclusion in the Wilderness System. A study area must meet the following criteria: Generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; has outstanding opportunities for solitude or a primitive and unconfined type of recreation; and has at least 5,000 contiguous roadless acres or is sufficient in size as to make practicable its preservation and use in an unimpaired condition (Draft Service Manual 610 FW 1.5) |
| Wilderness: | See Designated Wilderness |
| Wildfire: | A free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands (Service Manual 621 FW 1.7). |
| Wildland Fire: | Every wildland fire is either a wildfire or a prescribed fire (Service Manual 621 FW 1.3) |
| Wildlife-dependent recreation: | The public uses of hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. |
| Wildlife management: | The art and science of producing, maintaining, benefiting, and/or enhancing wildlife populations and their associated habitats. |

ACRONYMS AND ABBREVIATIONS

ACES - Alternative Choices through Educational Systems
ADA - Americans with Disabilities Act
ADCNR - Alabama Department of Conservation and Natural Resources
ADWFF - Alabama Division of Wildlife and Freshwater Fisheries
ANHP - Alabama Natural Heritage Program
APHIS - Animal and Plant Health Inspection Service
ATVs - All Terrain Vehicles
AWF - Alabama Wildlife Federation
BCC - Birds of Conservation Concern
BRT - Biological Review Team
BMPs - Best Management Practices
CCP - Comprehensive Conservation Plan
CHBCR - Central Hardwoods Bird Conservation Region
CHJVCP - Central Hardwoods Joint Venture Concept Plan
CHJVEP - Central Hardwoods Joint Venture Evaluation Plan
CFR - Code of Federal Regulations
Cfs - cubic feet per second
CRP - Conservation Reserve Program
CWCS - Comprehensive Wildlife Conservation Strategy
DDT - Dichloro-Diphenyl-Trichloroethane
DOI - Department of the Interior
DU - Ducks Unlimited
EA - Environmental Assessment
EIS - Environmental Impact Statement
EPA - U.S. Environmental Protection Agency
ESA - Endangered Species Act
EQIP - Environmental Quality Incentives Program
F – Fahrenheit
FAWN - Forestry Awareness Week Now
FTE - full-time equivalent
FSA - Farm Service Agency
FY - Fiscal Year
GCN - Greatest Conservation Need
GIS - Geographic Information System
GPS - Global Positioning Systems
GRP - Grassland Reserve Program
IPM - Integrated Pest Management
LEO - Law Enforcement Officer
LMRJCEP - Lower Mississippi River Joint Venture Evaluation Plan
LMVJV - Lower Mississippi Valley Joint Venture
LTCE - Lower Tennessee-Cumberland Ecosystem
LTCEBMP – Lower Tennessee-Cumberland Bird Management Plan
LPP - Land Protection Plan
MOU – Memorandum of Understanding
MSL - Mean Sea Level
NABCI - North American Bird Conservation Initiative
NASA - National Aeronautics and Space Administration
NAWMP - North American Waterfowl Management Plan
NEPA - National Environmental Policy Act

NPL - National Priorities List
NRCS - Natural Resource Conservation Service
NRHP - National Register of Historic Places
NWRS - National Wildlife Refuge System
PAH - Polycyclic Aromatic Hydrocarbons
PARC - Partners for Amphibian and Reptile Conservation
PCB - Polychlorinated Biphenyls
PFT - Permanent Full Time
RM - Refuge Manual
ROD - Record of Decision
ROW - Rights-Of-Way
RONS - Refuge Operating Needs Survey
RRP - Refuge Roads Program
SAMMS - Service Asset and Maintenance Management System
SCEP - Student Career Experience Program
SCWDS - Southeastern Cooperative Wildlife Disease Study
Service - U.S. Fish and Wildlife Service (also, FWS)
SHPO - State Historical Preservation Officer
SPMD - Semipermeable Membrane Device
TNC - The Nature Conservancy
UM/GLJV - Upper Mississippi/Great Lakes Joint Venture
USACE - United States Corp of Engineers
USC - United States Code
USFWS - U.S. Fish and Wildlife Service
WCS - Water Control Structures
WHIP - Wildlife Habitat Incentives Program
WRP - Wetland Reserve Program
WWRA - Wheeler Wildlife Refuge Association

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Appendix C. Relevant Legal Mandates and Executive Orders

National Wildlife Refuge System Authorities

The mission of the Fish and Wildlife Service is to conserve, protect, and enhance the nation's fish and wildlife and their habitats for the continuing benefit of the American people. The Service is the primary Federal agency responsible for migratory birds, endangered plants and animals, certain marine mammals, and anadromous fish. This responsibility to conserve our nation's fish and wildlife resources is shared with other Federal agencies and State and tribal governments. As part of this responsibility, the Service manages the National Wildlife Refuge System. This system is the only nationwide system of federal land managed and protected for wildlife and their habitats. The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Wheeler National Wildlife Refuge Complex is managed as part of this system in accordance with the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, the Refuge Recreation Act of 1962, Executive Order 12996 (Management and General Public Use of the National Wildlife Refuge System), Biological Integrity, Diversity, and Environmental Health Policy, and other relevant legislation, executive orders, regulations, and policies.

Key Legislation/Policies for Plan Implementation

The Wheeler National Wildlife Refuge Complex Comprehensive Conservation Plan describes and illustrates management-area projects with standards and guidelines for future decision-making and may be adjusted through monitoring and evaluation, as well as amendment and revision. The plan approval establishes conservation and land protection goals, objectives, and specific strategies for the Complex and its expansion. Compatible recreation uses specific to the refuge have been identified and approved by the refuge manager. This plan provides for systematic stepping down from the overall direction as outlined when making project- or activity-level decisions. This level involves site-specific analysis (e.g., Habitat Management Plan) to meet National Environmental Policy Act requirements for decision-making.

The legal mandates supporting the National Wildlife Refuge System are as follows:

| STATUE | DESCRIPTION |
|--------------------------------------|--|
| Administrative Procedures Act (1946) | Outlines administrative procedures to be followed by Federal agencies with respect to identification of information to be made public; publication of material in the Federal Register; maintenance of records; attendance and notification requirements for specific meetings and hearings; issuance of licenses; and review of agency actions. |

| STATUE | DESCRIPTION |
|--|--|
| American Antiquities Act of 1906 | Provides penalties for unauthorized collection, excavation, or destruction of historic or prehistoric ruins, monuments or objects of antiquity on lands owned or controlled by the United States. The Act authorizes the President to designate as national monuments objects or areas of historic or scientific interest on lands owned or controlled by the United States. |
| American Indian Religious Freedom Act of 1978 | Protects the inherent right of Native Americans to believe, express, and exercise their traditional religions, including access to important sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites. |
| Americans With Disabilities Act of 1990 | Intended to prevent discrimination of and make American Society more accessible to people with disabilities. The Act requires reasonable accommodations to be made in employment, public services, public accommodations, and telecommunications for persons with disabilities. |
| Anadromous Fish Conservation Act of 1965, as amended | Authorizes the Secretaries of Interior and Commerce to enter into cooperative agreements with States and other non-Federal interest for conservation, development, and enhancement of anadromous fish and contribute up to 50 percent as the Federal share of the cost of carrying out such agreements. Reclamation construction programs for water resource projects needed solely for such fish are also authorized. |
| Archaeological Resources Protection Act of 1979, as amended. | This Act strengthens and expands the protective provisions of the Antiquities Act of 1906 regarding archaeological resources. It also revised the permitting process for archaeological research. |
| Architectural Barriers Act of 1968 | Requires that buildings and facilities designed, constructed, or altered with Federal funds, or leased by a Federal agency, must comply with standards for physical accessibility. |
| Bald and Golden Eagle Protection Act of 1940, as amended | Prohibits the possession, sale or transport of any bald or golden eagle, alive or dead, or part, nest, or egg except as permitted by the Secretary of the Interior for scientific or exhibition purposes, or for the religious purposes of Indians. |
| Bankhead-Jones Farm Tenant Act of 1937 | Directs the Secretary of Agriculture to develop a program of land conservation and utilization in order to correct maladjustments in land use and thus assist in such things as control of soil erosion, reforestation, preservation of natural resources, and protection of fish and wildlife. Some early refuges and hatcheries were established under authority of this Act. |
| Cave Resources Protection Act of 1988 | Established requirements for the management and protection of caves and their resources on Federal lands, including allowing the land managing agencies to withhold the location of caves from the public, and requiring permits for any removal or collecting activities in caves on Federal lands. |

| STATUE | DESCRIPTION |
|--|---|
| Clean Air Act of 1970 | Regulates air emissions from area, stationary, and mobile sources. This Act and its amendments charge Federal land managers with direct responsibility to protect the “air quality and related values” of land under their control. These values include fish, wildlife, and their habitats. |
| Clean Water Act of 1974, as amended | This Act and its amendments have as its objective the restoration and maintenance of the chemical, physical, and biological integrity of the Nation’s waters. Section 401 of the Act requires that federally permitted activities comply with the Clean Water Act standards, state water quality laws, and any other appropriate State laws. Section 404 charges the U.S. Army Corps of Engineers with regulating discharge of dredge or fill materials into waters of the United States, including wetlands. |
| Emergency Wetlands Resources Act of 1986 | This Act authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act requires the Secretary to establish a National Wetlands Priority Conservation Plan, required the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amounts equal to import duties on arms and ammunition. It also established entrance fees at national wildlife refuges. |
| Endangered Species Act of 1973, as amended | Provides for the conservation of threatened and endangered species of fish, wildlife, and plants by Federal action and by encouraging the establishment of State programs. It provides for the determination and listing of threatened and endangered species and the designation of critical habitats. Section 7 requires refuge managers to perform internal consultation before initiating projects that affect or may affect endangered species. |
| Environmental Education Act of 1990 | This Act established the Office of Environmental Education within the Environmental Protection Agency to develop and administer a Federal environmental education program in consultation with other Federal natural resource management agencies, including the Fish and Wildlife Service. |
| Food Security Act of 1985, as amended (Farm Bill) | The Act contains several provisions that contribute to wetland conservation. The Swampbuster provisions state that farmers who convert wetlands for the purpose of planting after enactment of the law are ineligible for most farmer program subsidies. It also established the Wetland Reserve Program to restore and protect wetlands through easements and restoration of the functions and values of wetlands on such easement areas. |
| Farmland Protection Policy Act of 1981, as amended | The purpose of this law is to minimize the extent to which Federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. Federal programs include construction projects and the management of Federal lands. |

| STATUE | DESCRIPTION |
|--|--|
| Federal Advisory Committee Act (1972), as amended | Governs the establishment of and procedures for committees that provide advice to the Federal Government. Advisory committees may be established only if they will serve a necessary, nonduplicative function. Committees must be strictly advisory unless otherwise specified and meetings must be open to the public. |
| Federal Coal Leasing Amendment Act of 1976 | Provided that nothing in the Mining Act, the Mineral Leasing Act, or the Mineral Leasing Act for Acquired Lands authorized mining coal on refuges. |
| Federal-Aid Highways Act of 1968 | Established requirements for approval of Federal highways through wildlife refuges and other designated areas to preserve the natural beauty of such areas. The Secretary of Transportation is directed to consult with the Secretary of the Interior and other Federal agencies before approving any program or project requiring the use of land under their jurisdiction. |
| Federal Noxious Weed Act of 1990, as amended | The Secretary of Agriculture was given the authority to designate plants as noxious weeds and to cooperate with other Federal, State and local agencies, farmers associations, and private individuals in measures to control, eradicate, prevent, or retard the spread of such weeds. The Act requires each Federal land-managing agency, including the Fish and Wildlife Service, to designate an office or person to coordinate a program to control such plants on the agency's land and implement cooperative agreements with the States, including integrated management systems, to control undesirable plants. |
| Fish and Wildlife Act of 1956 | Establishes a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry but also includes the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment, and to maintain and increase public opportunities for recreational use of fish and wildlife resources. Among other things, it authorizes the Secretary of the Interior to take such steps as may be required for the development, advancement, management, conservation, and protection of fish and wildlife resources including, but not limited to, research, development of existing facilities, and acquisition by purchase or exchange of land and water or interests therein. |
| Fish and Wildlife Conservation Act of 1980, as amended | Requires the Service to monitor non-gamebird species, identify species of management concern, and implement conservation measures to preclude the need for listing under the Endangered Species Act. |

| STATUE | DESCRIPTION |
|--|---|
| Fish and Wildlife Coordination Act of 1958 | Promotes equal consideration and coordination of wildlife conservation with other water resource development programs by requiring consultation with the Fish and Wildlife Service and the State fish and wildlife agencies where the “waters of a stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted...or otherwise controlled or modified” by any agency under Federal permit or license. |
| Improvement Act of 1978 | This Act was passed to improve the administration of fish and wildlife programs and amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out volunteer programs. |
| Fishery (Magnuson) Conservation and Management Act of 1976 | Established Regional Fishery Management Councils comprised of Federal and State officials, including the Fish and Wildlife Service. It provides for regulation of foreign fishing and vessel fishing permits. |
| Freedom of Information Act, 1966 | Requires all Federal agencies to make available to the public for inspection and copying administrative staff manuals and staff instructions, official, published and unpublished policy statements, final orders deciding case adjudication, and other documents. Special exemptions have been reserved for nine categories of privileged material. The Act requires the party seeking the information to pay reasonable search and duplication costs. |
| Geothermal Steam Act of 1970, as amended | Authorizes and governs the lease of geothermal steam and related resources on public lands. Section 15 c of the Act prohibits issuing geothermal leases on virtually all Service-administrative lands. |
| Lacey Act of 1900, as amended | Originally designed to help states protect their native game animals and to safeguard U.S. crop production from harmful foreign species, this Act prohibits interstate and international transport and commerce of fish, wildlife or plants taken in violation of domestic or foreign laws. It regulates the introduction to America of foreign species into new locations. |
| Land and Water Conservation Fund Act of 1948 | This Act provides funding through receipts from the sale of surplus Federal land, appropriations from oil and gas receipts from the Outer Continental Shelf, and other sources for land acquisition under several authorities. Appropriations from the fund may be used for matching grants to States for outdoor recreation projects and for land acquisition by various Federal agencies, including the Fish and Wildlife Service. |

| STATUE | DESCRIPTION |
|---|--|
| Migratory Bird Conservation Act of 1929 | Established a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds. The role of the Commission was expanded by the North American Wetland Conservation Act to include approving wetlands acquisition, restoration, and enhancement proposals recommended by the North American Wetlands Conservation Council. |
| Migratory Bird Hunting and Conservation Stamp Act of 1934 | Also commonly referred to as the "Duck Stamp Act," it requires waterfowl hunters 16 years of age or older to possess a valid Federal hunting stamp. Receipts from the sale of the stamp are deposited into the Migratory Bird Conservation Fund for the acquisition of migratory bird refuges. |
| Migratory Bird Treaty Act of 1918, as amended | This Act implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Except as allowed by special regulations, this Act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, barter, and export or import any migratory bird, part, nest, egg, or product. |
| Mineral Leasing Act for Acquired Lands (1947), as amended | Authorizes and governs mineral leasing on acquired public lands. |
| Minerals Leasing Act of 1920, as amended | Authorizes and governs leasing of public lands for development of deposits of coal, oil, gas and other hydrocarbons, sulphur, phosphate, potassium, and sodium. Section 185 of this title contains provisions relating to granting rights-of-way over Federal lands for pipelines. |
| Mining Act of 1872, as amended | Authorizes and governs prospecting and mining for the so-called "hardrock" minerals (such as gold and silver) on public lands. |
| National and Community Service Act of 1990 | Authorizes several programs to engage citizens of the U.S. in full-and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Among other things, this law establishes the American Conservation and Youth Service Corps to engage young adults in approved human and natural resource projects, which will benefit the public or are carried out on Federal or Indian lands. |
| National Environmental Policy Act of 1969 | Requires analysis, public comment, and reporting for environmental impacts of Federal actions. It stipulates the factors to be considered in environmental impact statements, and requires that Federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unqualified environmental values are given appropriate consideration, along with economic and technical considerations. |

| STATUE | DESCRIPTION |
|--|--|
| National Historic Preservation Act of 1966, as amended | It establishes a National Register of Historic Places and a program of matching grants for preservation of significant historical features. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register. |
| National Trails System Act (1968), as amended | Established the National Trails System to protect the recreational, scenic, and historic values of some important trails. National Recreation Trails may be established by the Secretaries of Interior or Agriculture on land wholly or partly within their jurisdiction, with the consent of the involved State(s), and other land managing agencies, if any. National Scenic and National Historic Trails may only be designated by an Act of Congress. Several National Trails cross units of the National Wildlife Refuge System. |
| National Wildlife Refuge System Administration Act of 1966 | Prior to 1966, there was no single Federal law that governed the administration of the various wildlife refuges that had been established. This Act defines the National Wildlife Refuge System and authorizes the Secretary of the Interior to permit any use of an area provided such use is compatible with the major purposes(s) for which the area was established. |
| National Wildlife Refuge System Improvement Act of 1997 | This Act amends the National Wildlife Refuge System Administration Act of 1966. This Act defines the mission of the National Wildlife Refuge System, establishes the legitimacy and appropriateness of six priority wildlife-dependent public uses, establishes a formal process for determining compatible uses of Refuge System lands, identifies the Secretary of the Interior as responsible for managing and protecting the Refuge System, and requires the development of a comprehensive conservation plan for all national wildlife refuges. |
| Native American Graves Protection and Repatriation Act of 1990 | Requires Federal agencies and museums to inventory, determine ownership of, and repatriate certain cultural items and human remains under their control or possession. The Act also addresses the repatriation of cultural items inadvertently discovered by construction activities on lands managed by the agency. |
| Neotropical Migratory Bird Conservation Act of 2000 | Establishes a matching grants program to fund projects that promote the conservation of neotropical migratory birds in the United States, Latin America, and the Caribbean. |
| North American Wetlands Conservation Act of 1989 | Provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, the United States, and Mexico. The North American Wetlands Conservation Council is created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. Available funds may be expended for up to 50 percent of the United States share cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on Federal lands). |

| STATUE | DESCRIPTION |
|---|---|
| Refuge Recreation Act of 1962, as amended | This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife-dependent recreational development or protection of natural resources. It also authorizes the charging of fees for public uses. |
| Partnerships for Wildlife Act of 1992 | Establishes a Wildlife Conservation and Appreciation Fund, to receive appropriated funds and donations from the National Fish and Wildlife Foundation and other private sources to assist the State fish and game agencies in carrying out their responsibilities for conservation of non-game species. The funding formula is no more than 1/3 Federal funds, at least 1/3 Foundation funds, and at least 1/3 State funds. |
| Refuge Revenue Sharing Act of 1935, as amended | Provided for payments to counties in lieu of taxes from areas administered by the Fish and Wildlife Service. Counties are required to pass payments along to other units of local government within the county, which suffer losses in tax revenues due to the establishment of Service areas. |
| Rehabilitation Act of 1973 | Requires nondiscrimination in the employment practices of Federal agencies of the executive branch and contractors. It also requires all federally assisted programs, services, and activities to be available to people with disabilities. |
| Rivers and Harbors Appropriations Act of 1899, as amended | Requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States. The Fish and Wildlife Coordination Act provides authority for the Service to review and comment on the effects on fish and wildlife activities proposed to be undertaken or permitted by the Corps of Engineers. Service concerns include contaminated sediments associated with dredge or fill projects in navigable waters. |
| Sikes Act (1960), as amended | Provides for the cooperation by the Department of the Interior and Defense with State agencies in planning, development, and maintenance of fish and wildlife resources and outdoor recreation facilities on military reservations throughout the United States. It requires the Secretary of each military department to use trained professionals to manage the wildlife and fishery resource under his jurisdiction, and requires Federal and State fish and wildlife agencies be given priority in management of fish and wildlife activities on military reservations. |

| STATUE | DESCRIPTION |
|---|--|
| Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948 | This Act provides that upon determination by the Administrator of the General Services Administration, real property no longer needed by a Federal agency can be transferred, without reimbursement, to the Secretary of the Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes. |
| Transportation Equity Act for the 21st Century (1998) | Established the Refuge Roads Program, requires transportation planning that includes public involvement, and provides funding for approved public use roads and trails and associated parking lots, comfort stations, and bicycle/pedestrian facilities. |
| Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended | Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property. |
| Water Resources Planning Act of 1965 | Established Water Resources Council to be composed of Cabinet representatives including the Secretary of the Interior. The Council reviews river basin plans with respect to agricultural, urban, energy, industrial, recreational, and fish and wildlife needs. The Act also established a grant program to assist states in participating in the development of related comprehensive water and land use plans. |
| Wild and Scenic Rivers Act of 1968, as amended | This Act selects certain rivers of the nation possessing remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values; preserves them in a free-flowing condition; and protects their local environments. |
| Wilderness Act of 1964, as amended | The Wilderness Act of 1964 directs the Secretary of the Interior to review every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The Act permits certain activities within designated Wilderness Areas that do not alter natural processes. Wilderness values are preserved through a “minimum tool” management approach, which requires refuge managers to use the least intrusive methods, equipment, and facilities necessary for administering the areas. |
| Youth Conservation Corps Act of 1970 | Established a permanent Youth Conservation Corps (YCC) programs within the Departments of Interior and Agriculture. Within the Service, YCC participants perform many tasks on refuges, fish hatcheries, and research stations. |

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

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

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

Appendix D. Public Involvement

SUMMARY OF PUBLIC SCOPING

This appendix summarizes all public comments (both oral and written) that were received pertaining to the public scoping meetings, the Draft Comprehensive Conservation Plan (CCP) and the Environmental Assessment (EA) for Wheeler National Wildlife Refuge Complex. Preparation for the CCP development process for the Wheeler Complex began with a Biological Review in September 2002 and a Public Use Review in October 2003, to provide recommendations for the future management direction of the Complex. The following section briefly summarizes the efforts taken to solicit public input and presents the results of the public consultation process.

On June 8, 2005, the Wheeler Complex Planning Team was formed to identify issues and concerns regarding the refuges and their wildlife, habitats, and management. This team consisted of key members from Wheeler Complex staff and select individuals from Alabama's Department of Conservation and Natural Resources (ADCNR) Division of Wildlife and Freshwater Fisheries, Redstone Arsenal Military Base, and the Tennessee Valley Authority (TVA). Members from the Wheeler NWR staff included: the refuge manager, the deputy manager, the refuge planner, the assistant refuge manager, the wildlife biologist, and the supervisory park ranger. Ecological services also provided a Fish and Wildlife biologist. Outside agency participants included: a cultural resource and environmental specialist from Redstone Arsenal, a resource management and recreation specialist from TVA, a state non-game wildlife biologist, a state mussel biologist, and two state district wildlife supervisors. The planning team held its initial meeting on July 28, 2005, to develop a vision, outline management goals, and provide direction for organizing public meetings.

A CCP mailing list was developed for the Wheeler Complex that consisted of individuals from the general public, landowners, State agencies, organizations, governments, Native American Indian tribes, and other interested agencies. On August 30, 2005, more than 400 public meeting notices and comment sheets were mailed. Meeting notices provided a short explanation of the comprehensive conservation planning process and comment sheets requested permission from individuals to remain on the mailing list. The comment sheets were designed to allow for "free-hand" comments on values, issues, and concerns related to the Complex. Comment packets were also available at the public meeting, the Complex office and Visitor Center, and could be requested via mail or e-mail.

In September 2005, three public scoping meetings were conducted to obtain information and concerns from the public in the communities surrounding the four refuges. Meetings were held in the cities of Decatur, Florence, and Scottsboro, Alabama, in coordination with a variety of Federal, State, and local agencies. Announcements were sent to everyone on the CCP mailing list. Two (2) articles were written for the Wheeler Wildlife Association Newsletter and press releases were distributed to newspapers, magazines, and radio and television stations in advance of the meeting. A total of 48 people attended the meetings.

Refuge maps, comment sheets, planning brochures, and exhibits were available at the meeting. A brief presentation on the planning and environmental compliance processes was given by the Natural Resource Planner for Wheeler Complex. The assistant refuge manager provided the audience with an overview of wildlife management activities and the supervisory park ranger outlined the public use opportunities available at Wheeler Complex.

Following the formal presentations, attendees were given the opportunity to express their thoughts and ideas on refuge management. Many written comments were turned in after the meeting, others indicated that they would mail in their comments at a later date. As of December 31, 2006, 64 comment sheets had been received by the Service. The CCP and Final EA considered all input obtained from the meetings and the correspondence.

The biological and public use reviews and the public scoping meetings provided a list of priority issues that participants believed needed to be addressed in the CCP. A list of alternatives to address identified issues was developed. The proposed action formed the basis for development of objectives and strategies that are expected to achieve the goals identified by the Planning Team. This process ensured that the most important issues would be resolved or given priority over the life of the CCP. The summaries of the priority issues, along with some discussion on their impacts to the resource, follow.

MAJOR ISSUES IDENTIFIED

The planning team identified a number of issues relating to fish and wildlife protection, habitat restoration, recreation, and management of threatened and endangered species. Additionally, Federal and State mandates, plus applicable local ordinances, regulations, and plans were considered during the planning process.

INTERNAL ISSUES IDENTIFIED

Protect threatened and endangered species; enhance native habitats for migratory birds; intensify invasive species control; survey habitat and wildlife populations; restore wetland habitat; improve outreach and environmental education programs; evaluate contamination in surface water; monitor urban encroachment; facilitate appropriate and compatible wildlife-dependent recreation; increase law enforcement; and address inadequate facilities and staffing.

STATE REQUESTS

Develop and strengthen partnerships related to environmental education and visitor use programs; control invasive and exotic plant species; manage and protect migratory birds; manage and protect threatened and endangered species; and increase law enforcement.

TRIBAL ISSUES

Protect cultural resources by preventing even small-scale excavations and continue to enforce laws and regulations that prohibit the removal of artifacts.

PARTNERSHIPS' REQUESTS

Cooperate with partners, including other Federal agencies, State agencies, non-governmental organizations, and universities to conduct research on the various resources and habitat restoration programs being carried out on the Complex. Continue close coordination with the ADCNR on hunting and fishing programs on the refuges; on managing and protecting the endangered Alabama cavefish, gray bat, and Indiana bat; on promoting the Alabama Birding Trail; and on expanding the State's participation in refuge planning activities.

Continue the interagency agreement with Alabama Forestry Commission to provide initial response in wildfire situations. Continue to coordinate with the Alabama Department of Environmental Management (ADEM) on monitoring water contamination on the refuge. Develop a partnership with the cities of Decatur and Huntsville Convention and Visitors bureaus to promote compatible, sustainable, nature-oriented recreation and experiences for visitors to the Decatur-Huntsville area. Coordinate with ADCNR and Alabama's Department of Transportation (ALDOT) to maintain and improve boat launch areas as needed. Coordinate with Redstone Arsenal in preserving cultural resources, monitoring water pollution, and managing hunting programs.

SUMMARY OF PUBLIC SCOPING COMMENTS

Wheeler NWR – Consider increasing the number of hunting days for small game, specifically squirrels. Increase regulation and monitoring of deer hunting and improve efforts to control beavers. Implement a more aggressive program to eliminate the feral hog population through the use of modern firearms and provide additional hunting opportunities to the public. Consider a youth duck hunt and provide more handicapped accessible hunting areas.

Some citizens were concerned about having alligators on the refuge, while others were excited about the presence of alligators. Expand opportunities for wildlife photography enthusiasts by constructing photography blinds. Protect wildflowers such as *Trillium pucillum* and develop a downed wood management program for removing fallen trees of commercial value. Eliminate invasive and exotic species.

Several citizens felt that the amount and type of agricultural crops needed to support migratory birds need further definition and evaluation by Complex staff. Some citizens were in favor of increasing the acreage of prescribed burning, while others were concerned about particulates being released into the air from burning and were opposed to all forms of burning. Several negative comments were also recorded about the use of pesticides on the refuge. An encroachment issue from urban sprawl was a major concern for many adjacent landowners.

While citizens had no specific comments on land acquisition, they did comment on refuge administration issues, such as the management of gate openings and closings, and suggested that refuge roads be improved and maintained for easier access and for erosion control.

Among the issues identified during the scoping meeting, several were outside of the scope of the plan and the authority or the policy of the Service to address. The public was complimentary about the many opportunities for public use available on Wheeler NWR; however, several requests to increase the number of nature trails and reduce the number of motorized vehicles on the refuge were noted.

Other written comments stressed the following: the need for acquiring baseline data on waterfowl and shorebird usage; a comparison of research data and current water level management are needed to optimize moist-soil habitat for waterfowl, shorebirds, and fish; breeding habitat and rookery surveys for non-game birds should be conducted on a regular basis; and inventories are needed for freshwater mussels, reptiles, and amphibians.

Sauta and Fern Cave NWRs - Attendees of the public meeting in Scottsboro, Alabama, requested that current management and access polices for Sauta and Fern Cave NWRs be maintained and unchanged. Written comments indicated the following: continue to monitor and survey gray and Indiana bats; acquire baseline data on the American Hart's-tongue fern and Price's potato-bean; control and eliminate invasive and exotic species; and protect the archaeological resources in both caves.

Key Cave NWR - Attendees of the public meeting in Florence, Alabama, requested that current management and access polices for Key Cave NWR be maintained and unchanged. However, several written comments were received that requested more hunting opportunities, increased cooperative management of resources with adjacent landowners, and an opportunity to conduct bird dog hunting trials with horses. Other written comments stressed the following: continue to monitor and survey the gray bat; attempt to acquire baseline data on the Alabama cavefish; control and eliminate invasive and exotic species; and protect the archaeological resources in Key Cave.

PRIORITY ISSUES ADDRESSED BY ALTERNATIVES:

- Expanding hunting and fishing opportunities
- Providing wildlife observation and photography opportunities
- Developing a balanced wildlife-dependent recreation program
- Controlling sedimentation and contamination affecting refuge lands
- Controlling beavers to protect bottomland hardwoods
- Managing reforested lands
- Providing habitat for upland game birds
- Managing croplands for waterfowl
- Managing water levels and moist soil for waterfowl and shorebirds
- Providing technical assistance to private landowners

Further discussion of these issues and concerns can be found in Chapter III of the CCP (Section A).

DRAFT PLAN COMMENTS AND SERVICE RESPONSES

Public comments on the draft document were accepted from April 5 to May 21, 2007. A total of ten individuals from the general public, 22 individuals from the Birmingham Audubon Society, two non-governmental organizations, one federal government organization, one state government agency, and one Native American tribe submitted comments on the Draft CCP and EA, either in writing or at the public forum that was held on May 1, 2007. No comments were submitted by other federal agencies. Twenty-eight individuals expressed support for the proposed action (Alternative D), one individual supported Alternative C, five individuals stated “that the Draft CCP was excellent” but did not specifically mention the alternatives, one individual supported most of Alternative D but wanted more opportunities for horseback riding, and two individuals did not support the plan at all.

Under NEPA, the Service must respond to substantive comments. For purposes of this CCP, a substantive comment is one that was submitted during the public review and comment period which is within the scope of the proposed action (and the other alternatives outlined in the EA), is specific to the proposed action, has a direct relationship to the proposed action, and includes reasons for the Service to consider it. (For example, a substantive comment might be that the document referenced 500 individuals of a particular species, but that current research found 600. In such a case, the Service would likely update the plan to reflect the 600, citing the current research. While a comment that would not be considered substantive would be: “We love the refuge.”)

The comments submitted during the public review and comment period were evaluated, summarized, and grouped into several categories: Fish, Wildlife, and Plant Populations; Habitat Management; Resource Protection; Education and Visitor Services; Refuge Administration; and from the Environmental Assessment. The Service’s responses to the comments are provided in the following section and are arranged by category.

PUBLIC FORUMS

During the April 5 – May 21, 2007, public review period, the Complex and planning staffs hosted one public forum on May 1 at the Wheeler NWR Visitors Center, Decatur, Alabama (the town in which the Complex headquarters is located). The forum began at 6:00 p.m. and concluded at 9:00 p.m. The forum started as an open house with the Complex staff available to discuss the draft plan and refuge operations with the attendees. A 30-minute formal presentation on the draft plan was then given, followed by a facilitated discussion to solicit open-floor comments on the plan. A total of two individuals offered oral comments during this public forum. Four individuals also submitted written comments.

AFFILIATIONS OF RESPONDENTS

The table below identifies the names and affiliations of respondents who commented on the Draft CCP and EA, either in writing or at the public forum.

| Name of Respondent | Affiliation |
|---------------------------------|--|
| Andrew Page | Humane Society of the United States (HSUS) |
| Colonel (Ret.) John A. Neubauer | State of Alabama Historical Commission |
| Wesley L. Andrews | Seminole Tribe of Florida |
| Ray Vaughan | Wildlaw |
| Jon M. Loney | Tennessee Valley Authority (TVA) |
| Terry Slaton | Public Citizen |
| B. Sachau | Public Citizen |
| Jane A. Rowe | Public Citizen |
| Leo Rowe | Public Citizen |
| Greg Smith | Public Citizen |
| Tim Jones | Public Citizen |
| Linda Jones | Public Citizen |
| Nita Woodson | Public Citizen |
| Charles Howell | Public Citizen |
| Bill Thrasher | Public Citizen |
| Frank Farrell | Birmingham Audubon Society (BAS) |
| Ann A. Sweeny | Birmingham Audubon Society (BAS) |
| Peg McGowan | Birmingham Audubon Society (BAS) |
| Peggy King | Birmingham Audubon Society (BAS) |
| Mark Nelson | Birmingham Audubon Society (BAS) |
| Nancy Nelson | Birmingham Audubon Society (BAS) |
| Jean Folsom | Birmingham Audubon Society (BAS) |

| Name of Respondent | Affiliation |
|----------------------|----------------------------------|
| Kay Kinnear | Birmingham Audubon Society (BAS) |
| Bianca Allen | Birmingham Audubon Society (BAS) |
| Ellen McLaughlin | Birmingham Audubon Society (BAS) |
| Dianne Clark | Birmingham Audubon Society (BAS) |
| Ann Tate | Birmingham Audubon Society (BAS) |
| Edith Hunt | Birmingham Audubon Society (BAS) |
| Ethel Owen | Birmingham Audubon Society (BAS) |
| Mr. H.D. Burnum Jr. | Birmingham Audubon Society (BAS) |
| Mrs. H.D. Burnum Jr. | Birmingham Audubon Society (BAS) |
| Harriet Wright | Birmingham Audubon Society (BAS) |
| Mary Frances Slayton | Birmingham Audubon Society (BAS) |
| Susan Patton | Birmingham Audubon Society (BAS) |
| Hans Paul | Birmingham Audubon Society (BAS) |
| Lori Oswald | Birmingham Audubon Society (BAS) |
| Maureen Shaffer | Birmingham Audubon Society (BAS) |

The number of affiliations represented in the above table can be summarized as follows: federal government agency, 1; state agency, 1; non-governmental organization, 3; Native American tribe, 1; and public citizens (general public), 10.

COMMENT MEDIA

The types of media used to deliver the comments received by the refuge and planning staffs are categorized as follows: oral (given at the public forum), 2; written letter, 30; and e-mail, 5.

GEOGRAPHIC ORIGIN OF RESPONDENTS

The geographic origins of the individual respondents who submitted comments are Alabama, 33; Florida, 1; Tennessee, 1; Washington D.C., 1; and New Jersey, 1.

SUMMARY OF CONCERNS AND THE SERVICE'S RESPONSES

The public comments received address the following concerns. The Fish and Wildlife Service's responses to each concern are also summarized.

Fish and Wildlife Populations – Invasive, Exotic and Nuisance Animal Control

Comment: Make control of beavers a priority. I lease about 400 acres of land adjacent to Wheeler NWR in Madison County near the airport for hunting and fishing. We have to fight the beavers consistently to keep them from ruining the marsh, creeks, and timber.

Service Response: Under the proposed action (Alternative D), the Service proposes to increase efforts to control and minimize the damage caused from overpopulated beavers.

Comment: The Complex is using Executive Order 13112 of February 3, 1999, which addresses invasive species, in order to justify the hunting of feral hogs. This order also calls for accurate and reliable population monitoring. The draft CCP states that there are no formal data of feral hog populations in the Complex. "It is unlikely that these feral hog hunts will serve to control or reduce feral hog populations as implied in this CCP."

Service Response: Feral hogs are an extremely invasive non-native species that are known to occur on Wheeler NWR and Key Cave NWR. They can harbor several infectious diseases, some of which can be fatal to other wildlife. By rooting and wallowing, feral hogs destroy wildlife habitat. Damage includes erosion along waterways and wetlands and the loss of native plants. Additionally, feral hogs compete directly for food with deer, squirrels, and many other birds and mammals. They are predators of small mammals and deer fawns as well as ground-nesting birds.

Although no official or formal data exists that document feral hog populations, recent observations of destroyed habitat indicate that the populations of feral hogs are increasing both at Wheeler and Key Cave NWRs. Current efforts to control feral hogs by refuge staff and volunteers have been unsuccessful. Under the proposed action, the feral hog hunting program at Wheeler NWR would be expanded by increasing the season. At the present time, no feral hog hunting is planned at Key Cave NWR, however if feral hog densities increase, a feral hog hunt may be considered in the future.

Comment: The commenter disagrees with the Draft CCP that beavers are destroying habitat on the refuge and that "the destruction of dams and the killing of beaver are not the only solution available to deal with beaver conflicts". Using more socially acceptable methods such as oversize culverts that cannot be plugged, exclusion fencing, the mechanical protection of tree trucks, and pond leveling devices may prove to be cost effective.

Service Response: The Service disagrees with the comment. Beavers kill and damage stands of trees when dam and lodge construction holds water in areas longer than normal that results in prolonged flooding. These events can cause massive die-offs of large tracts of mature bottomland hardwoods, which take decades to recover. In addition, water can back up and flood adjacent landowners' properties. Problems associated with the impounding of water by beavers are proving to be the single greatest threat to timber resources and dewatering operations at Wheeler NWR. Attempts are made each year to develop culverts that cannot be plugged. These attempts have been unsuccessful.

Comment: "The CCP fails to take into account the effects that lethal beaver removal and dam destruction may have on the visitor experience of those who visit the refuge to view and photograph wildlife."

Service Response: Comment noted.

Comment: Geese don't bring on any of the fake diseases mentioned on page 78 of the draft CCP. "You are listing fake diseases of geese, trying to find reasons to murder them."

Service Response: The Service disagrees. Resident Canada geese refer primarily to local breeding Canada geese which nest and raise their young in northern Alabama, and more specific near Wheeler NWR. Resident Canada geese are currently adversely affecting the purpose(s) for which Wheeler NWR was established. They are seriously affecting moist-soil plant production in the refuge's impoundment system, and are also responsible for damaging agricultural crops planted to provide critical forage for migrating and wintering waterfowl. In addition, their fecal droppings

concentrate in pools of water created during impoundment drawdowns, and thereby may degrade overall water quality and may increase the potential for human and avian diseases transmitted by fecal material, such as cryptosporidiosis, giardiasis, and chlamydiosis (Conover & Chasko, 1985; Cooper & Keefe, 1997, and Hailu Kassa et al., 2007).

Fish and Wildlife Populations – Species of Concern

Comment: Pages 104-105 - Objective 1.20 discusses strategies for conserving the gray bat and Alabama cavefish populations in Key Cave. This discussion should note that TVA owns a portion of this cave, including the cave entrance. TVA should be listed as a partner agency in this effort.

Service Response: The Service agrees with this comment and has reworded Objective 1.20 to reflect TVA's ownership of the cave and mentions the valuable partnership that already exists between the Service and TVA.

Habitat Management – Farming Program

Comment 1: Leave a portion of each planted crop on each field.

Comment 2: Consider re-evaluating and improving the food plot program. It seems that the farmer co-op program has too many corn and bean fields that are not used much by wildlife. Keep food plots where you need them and make the farmers bid and contract to plant crops on the refuge land. Make a profit for the farming leases and use the revenue to accomplish more of above.

Service Response: Farming is an integral part of Wheeler NWR's management program and has been used for over 50 years to meet refuge goals. It provides food, browse, cover, and resting areas for waterfowl and other wildlife species. As the number of migratory Canada geese has declined from an average population of 35,000 in the late 1950s through the late 1980s to current averages below 5,000, the need for a large upland farming program has diminished. The use of cooperative farming requires a minimum of approximately 1,500 acres to meet refuge waterfowl objectives and provide shares for cooperative farmers. To allow for crop rotation, the cooperative farming program requires twice the above acreage. However, more corn and corn acreage may be required to fulfill these goals as the refuge refines acreages available for production of good moist-soil plants. Due to this situation, the refuge cannot leave a portion planted crops in every field, but only in areas of high waterfowl use.

Comment: No farming should be allowed at a NWR. Get the agribusiness out of this NWR. It is clear that the farm service is free loading its budget on NWR activities. The farm service budget should be paid for by the U.S. Dept of Agriculture and it should not be in a NWR. Get these freeloaders out of there. A NWR is not a farm.

Service Response: The cooperative farming program is a critical component of management for migratory birds, and, thus, a key objective of the Complex, and benefits a variety of other wildlife. Agriculture is used to produce "hot" foods, which helps the refuges in the Complex achieve the goals set out in the North American Bird Conservation Initiative, the North American Waterfowl Management Plan, and the Partners in Flight Bird Conservation Plan. These goals cannot be achieved without agriculture in combination with moist-soil and other natural foods. The Wheeler Complex staff does not have the budget or equipment to plant its own crops. Therefore, cooperative farming is currently the best method to achieve the purpose(s) for which the refuges were established.

Comment: Why doesn't your management staff get behind banning of fertilizer use instead of tolerating this contamination of the refuge?

Service Response: The production and widespread use of commercial fertilizers have resulted in the development of a very stable and productive agricultural system in the United States and worldwide. Farm managers routinely achieve levels of productivity that would have seemed improbable a few decades ago. On Wheeler and Key Cave NWRs, cooperative farmers use fertilizers to increase the production of food for wildlife. Fertilizers help increase the productivity of the soils for producing high-quality crops in smaller acreages.

The Service, through the development and issuing of farm management plans, require cooperative farming to use Best Management Practices (BMPs) when applying fertilizers on Complex lands. BMPs are cost-efficient operation methods that ensure that fertilizers are used effectively with minimal impact on the environment. By using BMPs, proper management of soils, water, crops, and fertilizer application can ensure that nutrients are available when it is most needed and least likely to be lost to the environment.

Comment: “Isn’t it time Wheeler Refuge makes farms stop using toxic chemicals”?

Service Response: The Service does not have jurisdiction over farmers on their own private land.

Habitat Management – Invasive Plant Species Control

Comment: Attack invasive weeds like alligator weed and parrot feather. They are right behind the beaver as an enemy to the habitat.

Service Response: Under the proposed action (Alternative D), the Service proposes to increase efforts to control and minimize alligator weed, parrot feather, and any other exotic and/or invasive plant species.

Habitat Management – Prescribed Burning

Comment: No prescribed burning. Burning releases fine particulate matter which can travel thousands of miles. It settles in the human body, causing lung cancer, pneumonia, heart attacks, strokes, asthma and allergies, especially for babies and seniors, hardly fair. This should be avoided entirely. It is air pollution, and exacerbates global warming. Why isn’t this refuge moving into the twenty-first century?

Service Response: Under the Service’s biological integrity policy (see 601 FW 3), refuges are charged with maintaining and restoring biological integrity, diversity, and environmental health. And under fire policies (see 621 FW 1 and 621 FW 3) refuges are to employ prescribed fire whenever it is an appropriate tool for managing resources. Many of the habitats in Alabama evolved with the natural and regular occurrence of fire, requiring fire to maintain these natural communities. However, due to a variety of factors, naturally occurring fire has been excluded from many areas (increasing the threat to public health and safety from wildfires).

Prescribed fire is one of many management tools that helps fulfill the purposes of Wheeler and Key Cave NWRs and the mission of the National Wildlife Refuge System, including helping restoration and maintenance of biological integrity of refuge habitats and management for threatened and endangered species and wildlife diversity. Prescribed fire offers two primary benefits: providing for habitat management and reducing threats to public health and safety from wildfires. Helping to protect public health and safety, prescribe fire maintains healthy levels of fuel loads, limits the occurrence of catastrophic fire, and provides for the direction of smoke (e.g., away from population centers).

Complex staff coordinates with local emergency management services and fire departments on all prescribed fires and wildfires. The Complex notifies the public when prescribed burns are planned to allow neighbors to take any needed precautions. All prescribed fire is conducted using sound professional judgment under Service and Department of Interior policy and specified conditions, including under an approved plan, which minimizes smoke impacts, helping to protect public health and safety. Currently, the prescribed fire activities conducted and anticipated to be conducted on the Complex are generally small and infrequent.

Comment: The Air Quality discussion in Chapter II - Refuge Overview, pages 30-31, was adequate at the time it was initially written. Since then the National Ambient Air Quality Standard (NAAQS) for particulate matter 24-hour primary standard metric has been changed from 65 to 35 micrograms per cubic meter. A pending change in the ozone NAAQS will also subject the region to greater scrutiny from an air quality perspective. The final Environmental Protection Agency staff paper on this NAAQS recommends a primary ozone standard in the range of 0.080 to 0.060 ppm. It also recommends that the secondary ozone standard be a cumulative, weighted total of daily 12-hour exposures over a three-month period within the growing season in the range of 21 to 7 ppm-hours.

While the Wheeler NWR area is presently in attainment with current standards, it is very close to the threshold for ozone and fine particle standards and potentially vulnerable to non-attainment. While few of the activities proposed in the plan would affect ozone levels, activities such as prescribed burning can affect particulate matter levels. We recommend that the Unavoidable Impacts and Minimization Measures section of the EA (pages 188-189) include a discussion of coordinating fire management activities with the Alabama Department of Environmental Management and the Alabama Forestry Commission in order to minimize the potential air quality impacts.

Service Response: The Service agrees with the comment and has added an additional section entitled "Air Quality" to the Unavoidable Impacts and Minimization Measures section of the EA.

Habitat Management – Forestry Management

Comment: Timber management (fake use of the word "management") when logging is what is meant by management. This use is not consistent at all and this use should be banned because of the negative anti environmental effects of logging.

Service Response: Forest management activities, such as timber harvest, are one of many management tools that help fulfill refuge purposes, goals, and objectives. Logging, chemical treatment, and prescribed burning are all biologically sound practices that benefit wildlife. All forestry management techniques will follow Alabama's Best Forestry Management Practices, which lessen negative impacts due to forestry management activities. All of the forestry management techniques that the Service would use on the Complex would promote hard and soft mast trees. These trees produce much of the food for native wildlife and migratory birds. Without sound forest management, these food-producing trees would be out-competed by less favorable species. Specific forest management activities will be addressed in greater detail in the Habitat Management step-down plans for individual refuges.

Resource Protection – Land and Visitor Protection

Comment 1: We support Alternative D because it would improve wildlife and habitat management as well as promote educational programs for visitors. We strongly support a Complex-wide litter control program and efforts to limit urban encroachment.

Comment 2: Increase litter patrol on refuge property, especially roadsides and fence lines by using the prisoners like the State DOT does on Highway 20.

Comment 3: I agree with your Alternative D plan to hire an additional law enforcement officer and to initiate a litter control program. My family enjoys having access to Wheeler NWR and would like to see it maintained without urban sprawl interference.

Service Response: Under the proposed action (Alternative D), the Service proposes to increase efforts to control and minimize litter.

Comment: Do whatever it takes to stop the illegal and perverted activities such as that at Beaverdam Boardwalk. I have not been able to take my family to Beaverdam or other similar Wheeler trails in years because of this horrible activity.

Service Response: Under the proposed action (Alternative D), the Service proposes to increase law enforcement efforts to control and minimize illegal activities. Efforts would be increased with an additional law enforcement officer.

Comment: Page 141 - Project 9E: Conduct a Study to Analyze Existing Rights-of-Way - We are interested in this study because we have several transmission line rights-of-way on Wheeler NWR. We would like to work with you on this study and would appreciate the opportunity to comment on a draft of its results.

Service Response: Comment noted.

Resource Protection – Cultural Resources

Comment: Upon review of the Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler NWR Complex, the Office of the State Historic Preservation Officer for Alabama agrees with the document with the stipulation that all undertakings are coordinated with its office prior to commencement of project activities, as indicated in the text (per Section 106 regulations)

Service Response: Comment noted.

Visitor Services (Public Use) – Hunting

Comment 1: I'm a voting hunter and fisherman. I would like to see MORE opportunities for both in the Wheeler Management Areas.

Comment 2: Be careful about increasing hunting on the refuge except to control deer and hogs. As much as I would love to be able to hunt more places, I would not want to jeopardize the enjoyment of non-hunters and cause a public misperception about the definition of a "refuge."

Service Response: Under the proposed action (Alternative D), the Service proposes to balance efforts to provide quality hunting and fishing opportunities with other uses.

Comment: Leave gates closed from the first day and last day of any scheduled hunting season on the refuge. (24/7 October – March)

Service Response: Gate opening/closing schedules are determined by addressing the needs of wildlife first, more specifically to limit disturbance to waterfowl during peak migration. Secondly, gate opening/closing schedules are designed to accommodate all of the activities shared by the large public use program at Wheeler NWR.

Comment: Do not overlap squirrel season to the first day of bow season. Give them extra days in February. It's unconscionable and dangerous.

Service Response: Wheeler NWR attempts to set its early squirrel season during the first two weeks of October. These dates are a direct result from public comments during the CCP scoping meetings. When October 15 falls on a Sunday or Monday, the State opens its deer season on the Saturday before, resulting in the season opening on October 13 or 14 in some years. In those years, this will result in a one-day overlap of the squirrel and deer seasons. Many national wildlife refuges and all State management areas routinely have hunting seasons that run concurrently for multiple species with few hunter safety concerns or user conflicts. Hunter safety programs have resulted in an increased awareness of the potential safety concerns. Fortunately, this situation arises on an average of only two of every 15 years.

Visitor Services (Public Use) – Opposition to Hunting

Comment: Eliminate all hunting on Wheeler NWR.

Service Response: Hunting is one of the six priority public uses specified in the National Wildlife Refuge System Improvement Act of 1997. The Service allows hunting as long as it is compatible with the mission of the Service, the National Wildlife Refuge System, and the purposes of Wheeler NWR.

Comment: I question the accuracy of SE cooperative wildlife disease study, which in my opinion is not competent to estimate deer populations. Biased science is junk science. Hunting means the strongest deer are killed and the weakest of species continue to live. Hunting means the herd keeps expanding because a deer herd will not overpopulate over its food supply and fetuses can be reabsorbed by pregnant deer. Hunting means more food and more fawns. Biologists are well aware of this and yet never mention it to allow gun psychopaths to continue hunting. When deer are killed, the birth rate of fawns soars. Stop the hunting which guarantees herd increase.

Service Response: Hunting is one of the six priority public uses identified in the 1997 Refuge Improvement Act, and hunting has been found to be compatible with the purpose for which Wheeler, Sauta Cave, and Key Cave NWRs were established. The Service supports improving hunting opportunities on these refuges and will try to balance the needs of all users. Hunting of white-tailed deer is necessary to keep deer from becoming overpopulated, which leads to disease, starvation, and increase in Lyme disease infections in humans, and increased vehicle/deer collisions.

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

Comment: Fox hunting is not a compatible use.

Service Response: The Service agrees that “Tally-Ho Fox hunting” as described on page 267 of the draft CCP is not compatible. The Compatibility Determination for Tally-Ho Fox hunting will be marked as NOT COMPATIBLE.

Comment: We are opposed to the Draft CCP and believe it violates the National Environmental Policy Act (NEPA), given that the U.S. Fish and Wildlife Service (Service) has failed to prepare an Environmental Impact Statement (EIS) on its national wildlife refuge sport-hunting program, or more broadly, its overall refuge recreational program. The FWS has failed to explain the status of Refuges 2003 or why it has apparently elected to halt the process.

Service Response: Comment is noted. This comment is outside the scope of this document.

Comment: The Refuge Improvement Act does not “relieve the [Service] of its obligations to consider the environmental impacts of, and alternatives to, the agency’s decisions with regard to hunting...”

Service Response: Comment is noted. The Service is proud of the more than 300 world-class hunting programs on national wildlife refuges that not only fulfill the Refuge Improvement Act’s mandate to provide opportunities for compatible, wildlife-dependent recreation to Americans, but the decades-old hunting program is also a fulfillment of America’s deeply rooted outdoor heritage that has, at its very core, the conservation mission that is the foundation of the Refuge System and the Fish and Wildlife Service. In addition to its recreational value, hunting gives resource managers an important tool in controlling populations of some species that might otherwise exceed the carrying capacity of their habitat. In 1966 and again in 1997, Congress expressly recognized the legitimacy of hunting on units of the Refuge System and directed the Service to facilitate these opportunities whenever they are compatible with the purposes for which the refuge was established. The Service currently considers hunting impacts through required refuge plans and environmental assessments, as well as annual national migratory bird population and harvest studies.

Comment: Sport hunting is not compatible with the purposes for which many refuges were created. Moreover, the HSUS states that there is no indication that the Service ensured the availability of sufficient funds before approving hunting initially on the refuges in the Complex. This comment refers to the Refuge Recreation Act.

Service Response: Hunting is one of the six priority public uses identified in the 1997 Refuge Improvement Act, and hunting has been found to be compatible with the purpose for which Wheeler, Sauta Cave, and Key Cave NWRs were established. The Service supports improving hunting opportunities on these refuges and will try to balance the needs of all users. Sufficient funds are available to implement the hunting programs for the refuges in the Wheeler Complex. These issues will be addressed more specifically in step-down management plans.

Comment: “The proposed CCP must take into account not only the effects of hunting on other wildlife species in the Complex, but also the cumulative impacts of hunting on wildlife, migratory birds, and non-hunting visitors to refuges throughout the Refuge System before permitting hunting.”

Service Response: Comment noted. This comment is outside the scope of this document.

Comment: “The FWS has failed to adequately study, develop and describe alternative uses to the available refuge resources.” The FWS must consider alternatives that are “focused on non-consumptive uses of the Complex, and their economic and other benefits.”

Service Response: Since hunting is a priority public use, the Service has included hunting in all alternatives presented in the Draft CCP and EA for the Complex.

Comment: The Service must complete a Section 7 evaluation. In addition, the HSUS states that “an agency must prepare a Biological Assessment which contains the information that is provided to the Fish and Wildlife Service at the inception of formal consultation.”

Service Response: The Service disagrees with the comment. Wheeler NWR Complex completed an Intra-Service Section 7 Biological Evaluation as part of the Draft CCP and EA. Based on the review, the Ecological Services Office issued a letter of concurrence on December 27, 2006.

Comment: The Service has compromised the biological integrity of refuges by allowing hunting and that the Service does not consider impacts of hunters on non-consumptive users. Hunting and the number of hunters is decreasing and the Service has not capitalized on potential economic gain that would come from non-consumptive users.

Service Response: Comment noted. This comment is outside the scope of this document.

Comment: The Service “must begin to realize the revenue potential of non-consumptive wildlife patrons and begin to reform their revenue base around this rapidly increasing segment of the population.” In addition, Wheeler NWR should conduct a survey of consumptive vs. non-consumptive visitors to the refuge to assess the economic input of each group. Use this study to determine “whether hunting is an economically viable option for the refuge or if it is simply retained as a means to appease a vocal minority.”

Service Response: Comment noted.

Comment: The commenter wants Wheeler NWR to stop white-tailed deer hunting. “Proving that deer, do, in fact, eat vegetation is a “far cry from definitively proving that they are endangering the continued survival of an ecosystem.”

Service Response: The Service disagrees with the comment. Based on the best biological information available and refuge staff expertise, the Service holds to the view that overpopulated deer have negative impacts on vegetation. Numerous studies have been published on the negative impacts of overpopulated deer on native vegetation and plant communities.

Comment: The very purpose and need for dove hunting should be called into question.

Service Response: The Service relies on the Migratory Bird Sport Hunting Frameworks to set hunting regulations of migratory birds annually. The Frameworks are based on the best biological information available. The current migratory bird hunts on the Wheeler Complex are limited to hunting doves on Key Cave NWR. Doves are locally abundant and dove hunting is popular in this area. Dove hunting occurs throughout the refuge, but is primarily conducted on the 295 acres of refuge cropland. The Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries (AWFF), records dove harvest rates on the adjacent 5,745-acre Seven Mile Island Wildlife Management Area (SMIWMA). During the last four years 2002-2005 an average of 913 doves per year was harvested during this period. Using harvest rates of 2 doves per man-day (AWFF-SMIWMA data) and the statewide average of 5.5 doves per man-day during this time (AWFF 2006), an estimated range of man-days per year, and with 35 total dove hunting days on the refuge, the estimate for annual dove harvest on Key Cave NWR is presented below.

Under the proposed action, Key Cave NWR estimates a maximum of 250–300 doves would be harvested each year. This harvest represents 0.0002 percent of Alabama’s four-year average harvest of 1,629,275 doves (AWFF 2006) and 0.00003 percent of the Eastern Mourning Dove Management Unit harvest in 2005-06 (Dolton and Rau 2006). Dove hunting at Key Cave NWR is only allowed on four days each week, which is more restrictive than regulations set forth by the Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries (AWFF). Dove hunting at Key Cave NWR should not have cumulative impacts on mourning dove populations.

Comment: The “continent-wide decline of the bobwhite is well known, however, this knowledge has not halted the hunting of this species.” In fact, even the CCP admits that the potential exists for the over-harvesting of northern bobwhite quail on Wheeler and Key Cave NWRs, but does not even consider the option of halting quail hunting on the Complex.

Service Response: Alternative D, states that the hunting program at Key Cave NWR will be evaluated annually. Results would dictate if the hunting program should be expanded, reduced, or remain the same. One method the Service uses to evaluate the hunting of northern bobwhite is to conduct surveys. Summer call count surveys for quail have been part of Key Cave NWR management since 1998. In 2001, fall bobwhite quail covey counts were initiated and during 2004 breeding bird point count surveys were also initiated. All three of these different surveys indicate abundant bobwhite quail populations on Key Cave NWR.

The early successional habitat that quail favor is abundant on Key Cave NWR and quail populations have increased as early successional habitat has been restored and managed (based on annual survey data 1998-2006). Quail populations have increased from an estimated two coveys in 1998 to a four-year average (2003-2006) of 16 coveys under the current hunting program. Under the proposed action, Key Cave NWR estimates a maximum of 50–75 quail would be harvested each year. This harvest impact represents 0.0002 percent of Alabama’s four-year average harvest of 326,075 quail (AWFF 2006).

Visitor Services (Public Use) – Public Access, Horseback Riding, Field Trials

Comment: Improve the public access to the refuge, but in a controlled and non-disturbing manner. Too many acres, especially those close to river are not accessible to folks like me. I like your driving tour idea.

Service Response: Comment noted.

Comment: I was pleased to attend your public forum last week at the Visitor Center. As expressed at the meeting, I am concerned how increased hunting days will affect horseback riders. Also, I request you to consider allowing compatible use of horse trails/hiking trails or riding behind gated roads at certain times of the year. Some automobile drivers are courteous by slowing down, but others drive dangerously fast, making it difficult to find areas to get out of the drivers way.

Service Response: Horseback riding is not a priority public use under current Service policy. Wheeler NWR is allowing historical use at present policy and usage rates. The refuge is not looking to expand horseback riding or to open more areas of the refuge to horseback riding.

Comment: Raccoon chasing (page 265 and 284) – Killing use is not compatible at all.

Response: Many local field trial clubs do not have adequate lands to conduct field trials. Chase open field trials are a low impact activity that have no long-term or cumulative effects and can be managed within existing refuge resources. They do not materially interfere with, or detract from, refuge goals, objectives, or refuge management activities; adversely affect refuge biological resources; or, conflict with wildlife-dependent priority public uses. Therefore, they are an acceptable form of wildlife-dependent recreation.

Wheeler National Wildlife Refuge lands are used for chase-only field trials for raccoon by organized field trial clubs. Field trials are conducted for 1-2 days each year by obtaining a refuge special use permit. Approximately 5 field trials are conducted each year by clubs in northern Alabama and southern Tennessee. Participants are required to conform to State laws and refuge regulations. No firearms, saws, or axes are allowed to be carried or used on the refuge and raccoons are to be left in trees unharmed. Dogs are not allowed to come in contact with raccoons or foxes.

Comment: Retriever trials should not be compatible.

Service Response: The Service disagrees. Retriever trials are a low impact activity that have no long-term or cumulative effects and can be managed within existing refuge resources. They do not materially interfere with or detract from refuge goals, objectives, or refuge management activities; adversely affect refuge biological resources; or, conflict with wildlife-dependent priority public uses. Therefore, they are an acceptable form of wildlife-dependent recreation.

Retriever clubs are required to obtain a refuge special use permit. Trials must be conducted in accordance with State regulations. Retriever club officials and trial participants must take care to avoid disturbance to waterfowl and other wildlife. Refuge gates must remain closed and an attendant on duty at gates to allow participants and observers to enter and exit and to prevent unauthorized entry. Pen-raised birds must be certified as disease free by the supplier and these birds must be inspected by refuge personnel prior to their use during field trials. No live birds may be released on the refuge. All birds must be removed from the refuge at the end of each day. Live ammunition must not be used or brought onto the refuge.

Administration – Planning

Comment: The Draft of the Comprehensive Plan and Environmental Assessment for Wheeler National Wildlife Refuge shows thoroughness and care. It is an excellent plan for the Wheeler Complex and the satellite refuges: Key Cave NWR, Sauta Cave NWR, and Fern Cave NWR, all in the Lower Tennessee-Cumberland Ecosystem. Though in a different ecosystem, the Watercress Darter National Wildlife Refuge in Bessemer, Alabama, is also a satellite administered by the Wheeler National Wildlife Refuge. Please include in your draft plan for its conservation and maintenance, as it surrounds Thomas Creek, home of the rare Watercress Darter.

Service Response: Although Watercress Darter NWR is currently under the administrative umbrella of Wheeler Complex, a separate CCP and EA will be developed under the direction of the Refuge Manager of Mountain Longleaf National Wildlife Refuge. Currently the planning phase is underway, with the draft CCP and EA scheduled to be released in 2008.

Comment: The notice and amount of time for commenting on the document should be expanded.

Service Response: Comment noted, however the Service disagrees. Current Service and NEPA policies provide for a 30-day comment period. Wheeler Complex management extended the review and comment period to 45 days to allow additional time for public review and comment. The public review and comment period extended from April 5, 2007 through May 21, 2007. Announcements of the public review period were placed in two (2) newspapers and copies of the document were placed in three (3) libraries.

Comment: Core team members - national taxpayers pay the freight for the costs of this area. But planners don't consider them important enough to have even ONE seat on planning. Incomprehensible and certainly a stupid set up. Put government employees in charge of projects and costs are rapidly out of control. Most have never had to meet a profit and loss statement.

Service Response: Comment noted.

Comment: By cutting this entire area into tiny pockets, the budget has morphed into far too high an amount. The areas should all be managed as one, staff and budget together.

Service Response: The Wheeler Complex is currently managed as four separate units; however it conducts all management activities with one staff, and with one budget.

Environmental Assessment – Cumulative Effects

Comment: We have reviewed quite a few Draft EAs and CCPs for other NWRs in the Southeast; all of them fell short in a certain areas. Many of the EAs failed to discuss land acquisition opportunities, direct and indirect impacts to refuge lands from air and water pollution and cumulative impacts. Many failed to acknowledge gaps in their information, such as a lack of data on certain species, water quality, and impacts of pollution. Your CCP readily admits where you do not have sufficient information on certain issues and subjects. This is a good thing to do; NEPA does not require perfect knowledge but the best knowledge available, and acknowledging information gaps is vital to an honest assessment and to planning where and how to gather additional information. Your CCP also sets out good goals and plans for gathering the information you lack but need. You and your staff are to be congratulated on doing a great job on these NEPA tasks and for producing the best EA/CCP we have yet seen from any NWR in the South.

Service Response: Comment noted.

Comment: The section of the EA entitled "Cumulative Impacts" is quite sparse and makes the odd statement, "The Service is not aware of any past, present, or reasonably foreseeable future planned actions that would result in a significant cumulative impact when added to the Complex's proposed actions, as outlined in the proposed alternative." (Page 202) Yet, the EA and the CCP especially are filled with discussions of the cumulative impacts occurring on and near the Complex and how the proposed management actions would interface with those impacts. These impacts include increasing development, contamination from DDT and agricultural practices, alterations to cave hydrology from private lands above the refuges, increased illegal activities, increased impacts from invasive species, and many more. You really do a good job of setting forth and considering these cumulative impacts, but the EA fails to recognize that fact. In the "Cumulative Impacts" section, you do not need to rehash all the information previously set out, but we wish you would reference it instead of stating that you don't know of any such actions, when you really do. The test for cumulative impacts is NOT "planned" actions but "past, present and reasonably foreseeable" actions, whether "planned" or not.

You have done a very good job of discussing those other actions and how they interact with your proposals. Use that section to state and emphasize that.

Service Response: To address this comment the Service has changed the Cumulative Impacts section of the EA to read as follows: “Under the proposed action, environmental education would receive increasing emphasis both on- and off-refuge lands. These enhanced efforts would likely lead to concomitant cumulative, beneficial impacts on the level of environmental knowledge and awareness in the citizens of northern Alabama. In addition, increased cooperation with local governments, the implementation of a contaminants monitoring and prevention program, and the development of a comprehensive invasive species control program would result in fewer negative cumulative impacts to the environment surrounding the Tennessee River Valley.”

“Furthermore, increased public use activities on the refuges would cumulatively result in increased demand for water, electricity, roads, lodging and other infrastructure. The combined impacts of all these activities would affect the surrounding communities and the ability of the local government to provide services. Similarly, other human activities, such as farming throughout the Complex, would result in alterations to the wildlife and habitats available. Best management farming practices must be used to minimize negative cumulative effects on water quality in the Tennessee River Valley.”

“Implementation of any of the four alternatives described in the Environmental Assessment, including actions relating to site development, fish and wildlife habitat and population management, and recreational use programs, would have both direct and indirect effects. However, the Complex staff does not expect the cumulative effects of these actions over the 15-year period of this plan to be significant.”

Appendix E. Appropriate Use Determinations

Wheeler National Wildlife Refuge Complex Appropriate Use Determinations

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

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

- Six wildlife-dependent recreational uses - As defined by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act), the six wildlife-dependent recreational uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) are determined to be appropriate for refuges. However, the refuge manager must still determine if these uses are compatible.
- Take of fish and wildlife under state regulations - States have regulations concerning take of wildlife that includes hunting, fishing, and trapping. The Service considers the take of wildlife under such regulations appropriate. However, the refuge manager must determine if the activity is compatible before allowing it on a refuge.

Statutory authorities for this policy:

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

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

Refuge Recreation Act of 1962, 16 U.S.C. 460k (Recreation Act). This law authorizes the Secretary of the Interior to “. . . administer such areas [of the System] or parts thereof for public recreation when in his judgment public recreation can be an appropriate incidental or secondary use.” While the Recreation Act authorizes us to allow public recreation in areas of the Refuge System when the use is an “appropriate incidental or secondary use,” the Improvement Act provides the Refuge System mission and includes specific directives and a clear hierarchy of public uses on the Refuge System.

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

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

Definitions:

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

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

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

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

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

- Promotes safety of participants, other visitors, and facilities.
- Promotes compliance with applicable laws and regulations and responsible behavior.
- Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives in a plan approved after 1997.
- Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation.
- Minimizes conflicts with neighboring landowners.
- Promotes accessibility and availability to a broad spectrum of the American people.
- Promotes resource stewardship and conservation.
- Promotes public understanding and increases public appreciation of America’s natural resources and our role in managing and protecting these resources.

-
- Provides reliable/reasonable opportunities to experience wildlife.
 - Uses facilities that are accessible and blend into the natural setting.
 - Uses visitor satisfaction to help define and evaluate programs.

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge(s) Name: Wheeler National Wildlife Refuge Complex – (Wheeler, Key Cave, Sauta Cave, and Fern Cave NWR's)

Use: Caving

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

Table with 3 columns: Decision Criteria, YES, NO. Rows include criteria like 'Do we have jurisdiction over the use?', 'Does the use comply with applicable laws...', 'Is the use consistent with applicable executive orders...', etc.

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

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

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

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

Not Appropriate Appropriate X

Refuge Manager: [Signature] [Redacted]

Date: 06/18/2007

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

Refuge Supervisor: [Signature] [Redacted]

Date: 7/16/07

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wheeler National Wildlife Refuge

Use: Right-of-Way Permits

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

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

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

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

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

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

Not Appropriate ___ **Appropriate** X

Refuge Manager:  **|| S ||**

Date: 06/18/2007

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

Refuge Supervisor:  **|| S ||**

Date: 7/16/07

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wheeler National Wildlife Refuge

Use: Special Fishing Events

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

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

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

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

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

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

Not Appropriate _____ **Appropriate** X _____

Refuge Manager: _____ **|| S ||** _____

Date: 06/18/2007

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

Refuge Supervisor: _____ **|| S ||** _____

Date: 7/16/07

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wheeler National Wildlife Refuge

Use: Chase Only Field Trials (Raccoon)

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

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

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

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

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

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

Not Appropriate _____ Appropriate X

Refuge Manager: _____
IISII

Date: 06/18/2007

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

Refuge Supervisor: _____
IISII

Date: 7/16/07

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wheeler National Wildlife Refuge Complex – (Wheeler, Key Cave, Sauta Cave, and Fern Cave NWR’s)

Use: Hiking, Walking, and Jogging

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

Table with 3 columns: Decision Criteria, YES, NO. Rows (a) through (j) with 'X' marks in YES and NO columns.

Where we do not have jurisdiction over the use [“no” to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe [“no” to (b), (c), or (d)] may not be found appropriate.

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

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

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

Not Appropriate _____ Appropriate X

Refuge Manager: [Signature] Date: 06/18/2007

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

Refuge Supervisor: [Signature] Date: 7/16/07

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Wheeler National Wildlife Refuge

Use: Tally-Ho Fox Hunting

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

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

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

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

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

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

Not Appropriate X ___

Appropriate ___

Refuge Manager: [Signature]
|| S ||

Date: 06/18/2007

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

Refuge Supervisor: [Signature]
|| S ||

Date: 7/16/07

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

Appendix F. Compatibility Determinations

Wheeler National Wildlife Refuge Complex Compatibility Determinations

Uses: The following uses were considered for compatibility determination reviews: hunting; fishing; wildlife observation and photography; environmental education and interpretation; hiking, walking, and jogging; bicycling; and chase only field trials. A description and anticipated biological impacts for each use are addressed separately in these compatibility determinations. Prior to this planning effort, compatibility determinations were conducted and approved in 2004 for non-wildlife dependent uses such as berry, fruit, and nut picking; bicycling; caving; cooperative farming; tree harvesting (firewood); horseback riding; picnicking; research; retriever trials; right-of-way permits; special fishing events and timber management. These uses were not re-evaluated in this plan. The following table lists the uses, refuges involved, approval dates, and re-evaluation dates.

| Use | Location | Date Approved | Re-evaluation Date |
|--------------------------------------|-----------------|----------------------|---------------------------|
| Berry, Fruit, and Nut Picking | Wheeler | 2004 | 2014 |
| Bicycling | Wheeler | 2004 | 2014 |
| Caving | Wheeler Complex | 2004 | 2014 |
| Cooperative Farming | Wheeler | 2004 | 2014 |
| Cooperative Farming | Key Cave | 2004 | 2014 |
| Tree Harvest (Firewood) | Wheeler | 2004 | 2014 |
| Horseback Riding | Wheeler | 2004 | 2014 |
| Picnicking | Wheeler | 2004 | 2014 |
| Research | Wheeler Complex | 2004 | 2014 |
| Retriever Trials | Wheeler | 2004 | 2014 |
| Right-of-Way Permits | Wheeler | 2004 | 2014 |
| Special Fishing Events | Wheeler | 2004 | 2014 |
| Timber Management | Wheeler | 2004 | 2014 |

Refuge(s) Names: Wheeler National Wildlife NWR Complex (for the purposes of this document it includes Wheeler, Key Cave, Sauta Cave, and Fern Cave NWRs)

Date(s) Established: Wheeler NWR - July 7, 1938; Key Cave NWR - January 3, 1997; Sauta Cave NWR - September 15, 1978; and Fern Cave NWR - October 27, 1981

Establishing and Acquisition Authorities:

Wheeler National Wildlife Refuge, located in Madison, Morgan, and Limestone Counties of Alabama, was established by Executive Order 7926 by President Franklin D. Roosevelt. Additional authority includes the Migratory Bird Conservation Act (1929) and the Refuge Recreation Act (1962).

Key Cave National Wildlife Refuge, located in Lauderdale County, Alabama, was established under the Fish and Wildlife Act of 1956, as amended (16 U.S.C. 742a-742j, not including 742d-l), and the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544).

Fern Cave and Sauta Cave National Wildlife Refuges, located in Jackson, County, Alabama, were both established under the Endangered Species Act of 1973, as amended (16 U.S.C.1531-1544).

Refuges' Purpose(s):

Wheeler National Wildlife Refuge

“... as a refuge and breeding ground for migratory birds and other wildlife: ...” Executive Order 7926, dated July 7, 1938

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

“... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ...” 16 U.S.C. § 460k-1 “... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ...” 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k4), as amended).

Key Cave National Wildlife Refuge

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

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ...” 16 U.S.C. § 1534 (Endangered Species Act of 1973)

Fern Cave and Sauta Cave National Wildlife Refuges

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ...” 16 U.S.C. § 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission:

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

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

Other Applicable Laws, Regulations, and Policies:

Antiquities Act of 1906 (34 Stat. 225)
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)
Criminal Code Provisions of 1940 (18 U.S.C. 41)
Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250)
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)
Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat. 1119)
Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)
Wilderness Act (16 U.S.C. 1131; 78 Stat. 890)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)
Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
The Property Clause of the U.S. Constitution Article IV 3, Clause 2
The Commerce Clause of the U.S. Constitution Article 1, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System. March 25, 1996
Title 50, Code of Federal Regulations, Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

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

Description of Use: Hunting – Wheeler National Wildlife Refuge

Opportunities for small game (i.e., squirrel, rabbit, raccoon, northern bobwhite, feral hog, and opossum) and either sex white-tailed deer hunts (archery and flintlock) on Wheeler NWR. The small game hunts are generally two-week seasons within the State hunting season framework. The either sex white-tailed deer season consists of the State's archery season and a two-week flintlock season within the State season framework.

Availability of Resources: Enforcement of refuge regulations to protect trust resources and provide for a quality recreational opportunity will occur via regular patrols by refuge law enforcement officers. Additionally, conservation law enforcement officers from the Alabama Department of Wildlife and Freshwater Fisheries will patrol the refuge and assist Service officers when needed.

The hunting program will cost approximately \$25,000 annually, which includes cost for publishing the hunting permits, conducting law enforcement patrols, and maintaining roads. Participation in the hunting program is estimated to be between 1,000 and 2,000 visitors annually. No offsetting revenues for hunting are collected.

Anticipated Impacts of the Use: The following anticipated impacts were identified and evaluated based on professional judgment.

Short-term Impacts: None of the hunts are anticipated to have any significant effects on the overall refuge populations being hunted. Impacts, such as incidental take of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At the current and anticipated public use levels, incidental take would be very small and would not directly or cumulatively impact current or future populations of wildlife either on this refuge or in the surrounding areas. Implementation of an effective law enforcement program and development of site-specific refuge regulations/special conditions would eliminate most incidental take problems. Littering, minor vegetation damage and wildlife disturbance can also be anticipated on an infrequent base.

Long-term Impacts: Monitoring of harvest would be accomplished through a volunteer call in system and data collection from refuge staff. Monitoring would provide a way to measure the health (population density relative to carrying capacity) of the impacted wildlife. If wildlife populations significantly change, that difference would be reflected in the overall harvest. The long-term impacts of hunting would be monitored on a yearly basis. As of this date, current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced or are anticipated to be experienced.

Cumulative Impacts: No cumulative impacts are anticipated. It is anticipated that the current levels and expected future levels of hunting or other wildlife-dependent recreation activities would not directly, indirectly, or cumulatively impact any listed, proposed, or candidate species or designated/proposed critical habitat. Data gathered from future biological surveys regarding the importance or potential importance of the refuge to threatened or endangered species or critical habitat (or proposed threatened species, endangered species, or critical habitat), could result in changes to public use activities across time; however, these changes would have no effect on listed species.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler National Wildlife Refuge Complex, which was announced in the Federal Register on April 5, 2007 (72 FR 16811) and made available for public comment for 45 days until May 21, 2007. Methods used to solicit public review and comment included posted notices at refuge headquarters and area locations; copies of

the draft comprehensive conservation plan distributed to adjacent landowners, the public, and local, state, and federal agencies; public meetings; and news releases to area newspapers. Appendix D summarizes the public comments.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Annual review of this activity will be conducted to minimize over-harvest of a particular species, assure public safety, assure that wildlife disturbance does not become a factor in critical wildlife use areas, and provide protection of overall refuge resources. Refuge hunting seasons will be set within the season constraints set forth by the State of Alabama. An Environmental Assessment (EA) will remain on file at the refuge headquarters as part of the Hunting Plan. Participants are required to obtain a refuge hunting permit and conform to State laws and refuge regulations. Certain areas are closed seasonally for wildlife purposes and for public safety due to urban development around the refuge boundary. Users must observe refuge regulations and note that certain areas are closed seasonally for wildlife purposes. Law enforcement efforts will be conducted to ensure compliance with State laws and refuge regulations.

Justification: Hunting is a wildlife-dependent activity that is compatible with refuge purposes and is identified in the 1997 National Wildlife Refuge System Improvement Act as an activity that should be provided and expanded on refuges, where compatible. Hunting provides a quality, wildlife-dependent recreation activity to the public and the opportunity to utilize a renewable resource. Providing this type of recreation is an objective of Wheeler National Wildlife Refuge. Many hunters travel to north Alabama to experience a quality and enjoyable hunting experience. As public hunting lands become less available, the use of national wildlife refuges for public hunting will increase.

NEPA Compliance for Refuge Use Description: *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 15-year Re-evaluation Date: July 1, 2022

Description of Use: Hunting – Key Cave National Wildlife Refuge

Key Cave National Wildlife Refuge offers opportunities for small upland game (i.e., squirrel, rabbit, raccoon, northern bobwhite, and opossum) and migratory bird (i.e., mourning dove) hunting in partnership with the Alabama Department of Conservation and Natural Resources. The hunts are limited to four hunting days per week (Monday, Tuesday, Friday, and Saturday) for the length of the statewide season for that particular game species. The hunting program will be evaluated annually. Results will dictate if the hunting program should be expanded, reduced, or remain the same.

Availability of Resources: Enforcement of refuge regulations to protect trust resources and provide for a quality recreational opportunity will occur via regular patrols by refuge law enforcement officers. Additionally, conservation law enforcement officers from the Alabama Division of Wildlife and Freshwater Fisheries will patrol the refuge and assist Service officers when needed. The hunting program will cost approximately \$25,000 annually, which includes cost for publishing the hunting permits, conducting law enforcement patrols, planting dove fields, and maintaining parking lots. Participation in the hunting program is estimated to be between 30 and 100 visitors annually. No offsetting revenues for hunting are collected.

Anticipated Impacts of the Use: The following anticipated impacts were identified and evaluated based on professional judgment.

Short-term Impacts: None of the hunts are anticipated to have any significant effects on the overall refuge populations being hunted. Impacts such as incidental take of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At the current and anticipated public use levels, incidental take would be very small and would not directly or cumulatively impact current or future populations of wildlife either on this refuge or in the surrounding areas. Implementation of an effective law enforcement program and development of site specific refuge regulations/special conditions would eliminate most incidental take problems. Littering, minor vegetation damage and wildlife disturbance can also be anticipated on an infrequent base.

Long-term Impacts: The long-term impacts of hunting will be evaluated on a yearly basis. As of this date, current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced or are anticipated to be experienced.

Cumulative Impacts: No cumulative impacts are anticipated. It is anticipated that the current levels and expected future levels of hunting or other wildlife-dependent recreation activities would not directly, indirectly, or cumulatively impact any listed, proposed, or candidate species or designated/proposed critical habitat. Data gathered from future biological surveys regarding the importance or potential importance of the refuge to threatened or endangered species or critical habitat (or proposed threatened species, endangered species, or critical habitat), could result in changes to public use activities across time; however, these changes would have no effect on listed species.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler National Wildlife Refuge Complex, which was announced in the Federal Register on April 5, 2007 (72 FR 16811) and made available for public comment for 45 days until May 21, 2007. Methods used to solicit public review and comment included posted notices at refuge headquarters and area locations; copies of the draft comprehensive conservation plan distributed to adjacent landowners, the public, and local, state, and federal agencies; public meetings; and news releases to area newspapers. Appendix D summarizes the public comments.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Annual review of this activity will be conducted to minimize over-harvest of a particular species, assure public safety, assure that wildlife disturbance does not become a factor in critical wildlife use areas, and provide protection of overall refuge resources. Refuge hunting seasons will be set within the season constraints set forth by the State of Alabama. An Environmental Assessment will remain on file at the Complex headquarters as part of the Hunting Plan. Participants are required to obtain a refuge hunting permit and conform to State laws and refuge regulations. Users must observe refuge regulations. Law enforcement efforts will be conducted to ensure compliance with State laws and refuge regulations.

Justification: Hunting is a wildlife-dependent activity that is compatible with refuge purposes and is identified in the 1997 National Wildlife Refuge System Improvement Act as an activity that should be provided and expanded on refuges, where compatible. Hunting provides a quality, wildlife-dependent recreation activity to the public and the opportunity to utilize a renewable resource. Providing this type of recreation is an objective of Key Cave National Wildlife Refuge. Many hunters visit north Alabama to experience a quality and enjoyable hunting experience. As public hunting lands become less available, the use of national wildlife refuges for public hunting will increase.

NEPA Compliance for Refuge Use Description: *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 15-year Re-evaluation Date: July 1, 2022

Description of Use: Hunting – Sauta Cave National Wildlife Refuge

Sauta Cave National Wildlife Refuge offers opportunities for small game (i.e., squirrel, rabbit, raccoon, northern bobwhite, and opossum) and either sex white-tailed deer hunts (archery only) in partnership with the Alabama Department of Conservation and Natural Resources.

Availability of Resources: Enforcement of refuge regulations to protect trust resources and provide for a quality recreational opportunity will occur via regular patrols by refuge law enforcement officers. Additionally, conservation law enforcement officers from the Alabama Division of Wildlife and Freshwater Fisheries will patrol the refuge and assist Service officers when needed.

The hunting program will cost approximately \$1,000 annually, which includes cost for publishing the hunting permits and conducting law enforcement patrols. Participation in the hunting program is estimated to be between 50 and 100 visitors annually. No offsetting revenues for hunting are collected.

Anticipated Impacts of the Use: The following anticipated impacts were identified and evaluated based on professional judgment.

Short-term Impacts: None of the hunts are anticipated to have any significant effects on the overall refuge populations being hunted. Impacts such as incidental take of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At the current and anticipated public use levels, incidental take would be very small and would not directly or cumulatively impact current or future populations of wildlife either on this refuge or in the surrounding areas.

Implementation of an effective law enforcement program and development of site-specific refuge regulations/special conditions would eliminate most incidental take problems. Littering, minor vegetation damage and wildlife disturbance can also be anticipated on an infrequent base.

Long-term Impacts: Monitoring of harvest will be accomplished through a volunteer call in system and data collection from refuge staff. Monitoring will provide a way to measure the health (population density relative to carrying capacity) of the impacted wildlife. If wildlife populations significantly change, that difference will be reflected in the overall harvest. The long-term impacts of hunting will be monitored on a yearly basis. As of this date, current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced or are anticipated to be experienced.

Cumulative Impacts: No cumulative impacts are anticipated. It is anticipated that the current levels and expected future levels of hunting or other wildlife-dependent recreation activities would not directly, indirectly, or cumulatively impact any listed, proposed, or candidate species or designated/proposed critical habitat. Data gathered from future biological surveys regarding the importance or potential importance of the refuge to threatened or endangered species or critical habitat (or proposed threatened species, endangered species, or critical habitat), could result in changes to public use activities across time; however, these changes would have no effect on listed species.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler National Wildlife Refuge Complex, which was announced in the Federal Register on April 5, 2007 (72 FR 16811) and made available for public comment for 45 days until May 21, 2007. Methods used to solicit public review and comment included posted notices at refuge headquarters and area locations; copies of the draft comprehensive conservation plan distributed to adjacent landowners, the public, and local, state, and federal agencies; public meetings; and news releases to area newspapers. Appendix D summarizes the public comments.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Annual review of this activity will be conducted to minimize over-harvest of a particular species, assure public safety, assure that wildlife disturbance does not become a factor in critical wildlife use areas, and provide protection of overall refuge resources. Refuge hunting seasons will be set within the season constraints set forth by the State of Alabama. An Environmental Assessment will remain on file at the Complex headquarters as part of the Hunting Plan. Participants are required to obtain a refuge hunting permit and conform to State laws and refuge regulations. Users must observe refuge regulations. Law enforcement efforts will be conducted to ensure compliance with State laws and refuge regulations.

Justification: Hunting is a wildlife-dependent activity that is compatible with refuge purposes and is identified in the 1997 National Wildlife Refuge System Improvement Act as an activity that should be provided and expanded on refuges, where compatible. Hunting provides a quality, wildlife-dependent recreation activity to the public and the opportunity to utilize a renewable resource. Providing this type of recreation is an objective of Sauta Cave National Wildlife Refuge. Many hunters visit north Alabama to experience a quality and enjoyable hunting experience. As public hunting lands become less available, the use of national wildlife refuges for public hunting will increase.

NEPA Compliance for Refuge Use Description: *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 15-year Re-evaluation Date: July 1, 2022

Description of Use: Fishing – Wheeler National Wildlife Refuge

Sport fishing on Wheeler National Wildlife Refuge of game fish including method of take, daily creel limits, possession limits, and size limits is conducted in accordance with State of Alabama regulations. Approximately 14,000 surface acres of water are available for fishing. Special refuge regulations apply to posted areas.

Availability of Resources: Enforcement of refuge regulations to protect trust resources and provide for a quality recreational opportunity will occur via regular patrols by refuge law enforcement officers. Additionally, conservation law enforcement officers from the Alabama Division of Wildlife and Freshwater Fisheries will patrol the refuge and assist Service officers when needed.

The fishing program will cost approximately \$25,000 annually, which includes costs to provide the fishing brochure, conduct law enforcement activities and patrols, and maintaining access to roads, parking areas and trails. Participation in the fishing program is estimated to be between 250,000 and 300,000 visitors annually. No offsetting revenues for fishing are collected.

Anticipated Impacts of the Use: The following anticipated impacts were identified and evaluated based on professional judgment.

Short-term Impacts: This activity might result in low-level impacts to vegetation due to trampling and removal during bank fishing activities. Temporary disturbance to wildlife species may also result from this activity. Other anticipated problems such as littering, vandalism, removal of artifacts, and other violations of refuge regulations may result from this activity. No adverse impacts are expected as a result of this use. Area closures will be established with the objective of preventing disturbance to migratory waterfowl.

Long-term Impacts: Current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced or are anticipated to be experienced.

Cumulative Impacts: No cumulative impacts are anticipated.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler National Wildlife Refuge Complex, which was announced in the Federal Register on April 5, 2007 (72 FR 16811) and made available for public comment for 45 days until May 21, 2007. Methods used to solicit public review and comment included posted notices at refuge headquarters and area locations; copies of the draft comprehensive conservation plan distributed to adjacent landowners, the public, and local, state, and federal agencies; public meetings; and news releases to area newspapers. Appendix D summarizes the public comments.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Bank fishing is permitted only during daylight hours, except in special designated night bank fishing areas. Designated night bank fishing areas include all six improved boat launching facilities (Arrowhead Landing, Bluff City, Hickory Hills, Sharp's Ford/Cotaco Creek, Talucah Landing, and Triana) plus U.S. 31 Causeway north/east to White Springs #1 water control structure, Arrowhead Landing Road, Rockhouse Pump station west to Rockhouse Road, Crabtree Slough Road from Alabama 67 to end of road, and the Handicapped Fishing Pier located on Highway 67 near Decatur. Fishing from boats is permitted 24 hours a day.

Law enforcement efforts will ensure compliance with State of Alabama laws and refuge-specific regulations. All or parts of the refuge may be closed to fishing at any time if necessary for public safety, to provide wildlife sanctuary, or for administrative reasons. Periodic review of these activities will help assure that wildlife disturbance does not become a factor in critical wildlife use areas. Users must observe refuge regulations and note that certain areas are closed seasonally for wildlife purposes.

Justification: Fishing is a low impact wildlife-dependent activity that is compatible with refuge purposes and is identified in the 1997 National Wildlife Refuge System Improvement Act as an activity that should be provided and expanded on refuges, where compatible. Fishing provides a quality, wildlife-dependent recreation activity to the public and the opportunity to utilize a renewable resource. Providing this type of recreation is an objective of Wheeler National Wildlife Refuge.

NEPA Compliance for Refuge Use Description: *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 15-year Re-evaluation Date: July 1, 2022

Description of Use: Fishing – Fern Cave National Wildlife Refuge

Sport fishing on Fern Cave National Wildlife Refuge of game fish including method of take, daily creel limits, possession limits, and size limits is conducted in accordance with State of Alabama regulations. Approximately 300 feet of bank fishing is available for fishing along the Paint Rock River.

Availability of Resources: Enforcement of refuge regulations to protect trust resources and provide for a quality recreational opportunity will occur via regular patrols by refuge law enforcement officers. Additionally, conservation law enforcement officers from the Alabama Division of Wildlife and Freshwater Fisheries will patrol the refuge and assist Service officers when needed.

The fishing program will cost approximately \$1,000 annually, which includes costs to provide the fishing brochure, conduct law enforcement activities and patrols, and maintain access to roads, parking areas, and trails. Participation in the fishing program is estimated to be between 10 and 50 visitors annually. No offsetting revenues for fishing are collected.

Anticipated Impacts of the Use: The following anticipated impacts were identified and evaluated based on professional judgment.

Short-term Impacts: This activity might result in low-level impacts to vegetation due to trampling and removal during bank fishing activities. Temporary disturbance to wildlife species may also result from this activity. Other anticipated problems such as littering, vandalism, removal of artifacts, and other violations of refuge regulations may result from this activity. No adverse impacts are expected as a result of this use.

Long-term Impacts: Current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced or are anticipated to be experienced.

Cumulative Impacts: No cumulative impacts are anticipated.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler National Wildlife Refuge Complex, which was announced in the Federal Register on April 5, 2007 (72 FR 16811) and made available for public comment for 45 days until May 21, 2007. Methods used to solicit public review and comment included posted notices at refuge headquarters and area locations; copies of the draft comprehensive conservation plan distributed to adjacent landowners, the public, and local, state, and federal agencies; public meetings; and news releases to area newspapers. Appendix D summarizes the public comments.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Bank fishing is permitted only during daylight hours. Law enforcement efforts will ensure compliance with State of Alabama laws and refuge-specific regulations. All or parts of the refuge may be closed to fishing at any time if necessary for public safety, or for administrative reasons. Periodic review of these activities will help assure that wildlife disturbance does not become a factor. Users must observe refuge regulations.

Justification: Fishing is a low impact wildlife-dependent activity that is compatible with refuge purposes and is identified in the 1997 National Wildlife Refuge System Improvement Act as an activity that should be provided and expanded on refuges, where compatible. Fishing provides a quality, wildlife-dependent recreation activity to the public and the opportunity to utilize a renewable resource. Providing this type of recreation is an objective of Fern Cave National Wildlife Refuge.

NEPA Compliance for Refuge Use Description: *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 15-year Re-evaluation Date: July 1, 2022

Description of Use: Wildlife Observation and Photography – Wheeler National Wildlife Refuge Complex (includes Wheeler, Key Cave, Sauta Cave, and Fern Cave NWRs)

Each year many visitors come to the refuges in the Wheeler Complex to see and photograph wildlife. During the winter months at Wheeler National Wildlife Refuge, thousands of waterfowl are easily seen from the observation building, observation tower, and photography blinds. Other opportunities exist for enjoying these activities by boating, by walking, or by driving the public roads. During the summer months at Sauta Cave National Wildlife Refuge, many bat enthusiasts come to witness the wildlife emergence of bats from cave openings.

Wildlife observation and photography by walking; by using motorized vehicles, motorized/non-motorized boats, bicycles, or horses; or from using refuge observation/photography facilities have occurred on the refuges in the Wheeler Complex since their inception.

More recently, wildlife photography, including image-capturing activities such as videography, has become extremely popular. Professional photographers and semi-professional photographers also use the refuges to capture wildlife photos. Temporary photo blinds are sometimes used to enhance the experience.

To support these uses, foot travel is generally allowed on refuge roads, dikes, and trails. At Wheeler NWR, motorized vehicles, bicycles, and horses are restricted to open graveled roads. However, boats are permitted year-round.

Availability of Resources: Wildlife observation and photography programs cost approximately \$10,000 annually. Minor amounts of personnel time associated with administration activities, facility maintenance, habitat management, and law enforcement patrols are required. Continued maintenance, construction, and rehabilitation of the following facilities must continue: observation buildings, observation towers, photography blinds, access roads, wildlife drive (auto tour), kiosks, and brochures. No offsetting revenues for wildlife observation and photography activities are collected. Anticipated Impacts of the Use: The following anticipated impacts were identified and evaluated based on professional judgment.

Short-term Impacts: This activity might result in low-level impacts to vegetation due to trampling and removal. Temporary disturbance to wildlife species may also result from this activity. Occasionally, animals are killed or injured by vehicles while crossing refuge roads. Other anticipated problems such as littering, vandalism, removal of artifacts, and other violations of refuge regulations may result from this activity.

Long-term Impacts: Current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced or are anticipated to be experienced.

Cumulative Impacts: No cumulative impacts are anticipated.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler National Wildlife Refuge Complex, which was announced in the Federal Register on April 5, 2007 (72 FR 16811) and made available for public comment for 45 days until May 21, 2007. Methods used to solicit public review and comment included posted notices at refuge headquarters and area locations; copies of the draft comprehensive conservation plan distributed to adjacent landowners, the public, and local, state, and federal agencies; public meetings; and news releases to area newspapers. Appendix D summarizes the public comments.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Law enforcement patrols of public use area and refuge roads should continue to minimize the above-mentioned types of violations. Periodic review of these activities will help assure that wildlife disturbance does not become a factor in critical wildlife use areas. Users must observe refuge regulations and note certain areas are closed seasonally for wildlife purposes.

Justification: Wildlife observation and photography are important and preferred public uses on Wheeler National Wildlife Refuge Complex and the National Wildlife Refuge System. The 1997 National Wildlife Refuge System Improvement Act identified wildlife observation and photography as a priority public recreational use to be facilitated on refuges, where compatible. It is through permitted, compatible public uses such as this, that the public becomes aware of and provides support for our national wildlife refuges. Providing this type of recreation is an objective of Wheeler National Wildlife Refuge Complex.

NEPA Compliance for Refuge Use Description: *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 15-year Re-evaluation Date: July 1, 2022

Description of Use: Environmental Education and Interpretation – Wheeler National Wildlife Refuge Complex (includes Wheeler, Key Cave, Sauta Cave, and Fern Cave NWRs)

Environmental education and interpretation are those activities which seek to increase the public's knowledge and understanding of wildlife, national wildlife refuges, ecology, and land management, as well as contribute to the conservation of natural resources. Current activities include traditional environmental education activities such as staff-led or teacher-led on- and off-site programs to interpret wildlife resources using refuge educational facilities. Other methods would include on-site teacher/student workshops and off-site exhibits/presentations. While Wheeler NWR includes on- and off-site environmental education and interpretive programs and activities, Fern Cave, Sauta Cave, and Key Cave NWRs only conduct off-site environmental education and interpretive programs.

Environmental education and interpretation reach approximately 10,000 and 75,000 visitors respectively on Wheeler Complex and provides them with the awareness of the following specific resource problems that are in need of resolution: (1) protection of fragile wetlands and other natural resources; (2) protection of habitat for threatened and endangered species; (3) awareness of refuge management techniques and why the refuges use them; and (4) the development of pride in public lands to reduce littering, poaching, and vandalism. Environmental education and interpretation reach a large and diverse audience of visitors that otherwise would not be well-informed of issues on national wildlife refuges.

Wheeler Complex uses environmental education and interpretation to motivate citizens of all ages to action and to help them understand their role in protecting a healthy ecosystem. Environmental education and interpretation is a tool Wheeler NWR uses to build a land ethic; develop political support; lessen vandalism, littering, and poaching; and to become visible in the community in a positive way.

Availability of Resources: Current staffing at the Wheeler Complex is limited with only three park rangers dedicated to public use programs. The management of a volunteer program will be essential to successfully implement the education and visitor use program. Volunteers are recruited and trained to assist staff in developing and implementing environmental education and interpretive programs.

Environmental education and interpretation programs at Wheeler Complex will cost approximately \$20,000 annually. Continued maintenance, construction, and rehabilitation of the following facilities must continue: Visitor Center, observation building, observation tower, access roads, wildlife drive (auto tour) kiosks, brochures, and interpretive trails. No offsetting revenues for environmental education and interpretation are collected.

Anticipated Impacts of the Use: The following anticipated impacts were identified and evaluated based on professional judgment.

Short-term Impacts: The use of on-site, hands-on, action-oriented activities to accomplish environmental education and interpretive tours may impose a low-level impacts on the sites used for these activities. These low-level impacts may include trampling of vegetation and temporary disturbance to wildlife species in the immediate area. It is not anticipated, however, that such impacts would be permanent or long-lasting. Educational activities conducted off refuge lands will not create any biological impacts on the resource.

Long-term Impacts: Current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced or are anticipated to be experienced.

Cumulative Impacts: No cumulative impacts are anticipated.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler National Wildlife Refuge Complex, which was announced in the Federal Register on April 5, 2007 (72 FR 16811) and made available for public comment for 45 days until May 21, 2007. Methods used to solicit public review and comment included posted notices at refuge headquarters and area locations; copies of the draft comprehensive conservation plan distributed to adjacent landowners, the public, and local, state, and federal agencies; public meetings; and news releases to area newspapers. Appendix D summarizes the public comments.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Zoning of visitor activities by time and space, clustering public use facilities, proper monitoring, educating visitors, and law enforcement will ensure compatibility with the purposes of the Refuge Complex and mission of the National Wildlife Refuge System. Through periodic evaluation of trails and visitor contact points, the visitor services program will assess impacts to ensure the resource is not be degraded. If future human impacts are determined through evaluation to be detrimental to important natural resources, actions will be taken to reduce or eliminate those impacts.

On-site outdoor activities should be held where minimal impact to refuge resources would occur. If evidence of unacceptable adverse impacts begin to appear, it may be necessary to rotate the location of outdoor classroom activities. Regulations to ensure the safety for all participants should be reviewed with the teacher(s) responsible for the activities before students begin the activities.

Justification: Environmental education and interpretation have been identified in the National Wildlife Refuge System Improvement Act of 1997 as priority wildlife-dependent recreational uses that should be provided and expanded if they are compatible with the purpose for which the refuge was established. Educating and informing the public through structured environmental education courses, interpretive materials, and guided tours about migratory birds, endangered species, wildlife management, and ecosystems will lead to improved support of the Service's mission to protect our natural resources. Providing this type of activity is an objective of Wheeler National Wildlife Refuge Complex.

Education facilities at Wheeler NWR, such as the Visitor Center, nature trails, environmental education classrooms, and the wildlife observation building, obviously take funding to maintain. The expense should be weighed against the program objectives. At the Wheeler Complex, the expense of the environmental education and interpretation program is well worth its accomplishments.

NEPA Compliance for Refuge Use Description: *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 15-year Re-evaluation Date: July 1, 2022

Description of Use: Hiking, Walking, Jogging – Wheeler National Wildlife Refuge Complex (includes Wheeler, Key Cave, Sauta Cave, and Fern Cave NWRs)

The road and trail systems located on refuges within the Wheeler National Wildlife Refuge Complex provide a unique setting for hiking, walking, or jogging. There are more than 100 miles of roads and dikes, as well as six nature trails use for this activity. Hiking, walking, and jogging facilitate wildlife observation and photography.

Availability of Resources: The hiking, walking, and jogging uses at the Wheeler National Wildlife Complex will cost approximately \$5,000 annually. Minor amounts of personnel time associated with administration activities, road maintenance, habitat management, and law enforcement patrols are required. No offsetting revenues for hiking, walking, and jogging are collected.

Anticipated Impacts of the Use: The following anticipated impacts were identified and evaluated based on professional judgment.

Short-term Impacts: Impacts such as free roaming pets, littering, vegetation disturbance, and wildlife disturbance can be anticipated, but not on a frequent basis. The refuge roads and dikes are maintained for refuge management purposes. It is not anticipated that the overall impacts would be long-lasting.

Long-term Impacts: Current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced or are anticipated to be experienced.

Short-term Impacts: No cumulative impacts are anticipated.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler National Wildlife Refuge Complex, which was announced in the Federal Register on April 5, 2007 (72 FR 16811) and made available for public comment for 45 days until May 21, 2007. Methods used to solicit public review and comment included posted notices at refuge headquarters and area locations; copies of the draft comprehensive conservation plan distributed to adjacent landowners, the public, and local, state, and federal agencies; public meetings; and news releases to area newspapers. Appendix D summarizes the public comments.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Law enforcement patrol of public use area and refuge roads should continue to minimize the above mentioned types of violations. Periodic review of these activities to assure that wildlife disturbance does not become a factor in critical wildlife use areas. Users must observe refuge regulations and note certain areas are closed seasonally for wildlife purposes.

Justification: Hiking, walking, and jogging are low impact activities. They are deemed wildlife-oriented recreational activities as wildlife or wildlands observation is an expected or anticipated part of the hiking, walking, and jogging experience on refuge lands. Providing this type of recreation is an objective of the Wheeler National Wildlife Refuge Complex.

NEPA Compliance for Refuge Use Description: *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-year Re-evaluation Date: July 1, 2017

Description of Use: Chase Only Field Trials (Raccoon) – Wheeler National Wildlife Refuge

Wheeler National Wildlife Refuge lands are used for chase only field trials for raccoon by organized field trial clubs. Field trials are conducted for 1-2 days each year by obtaining a refuge special use permit. Approximately 5 field trials are conducted each year by clubs in northern Alabama and southern Tennessee.

Availability of Resources: The Chase Only Field Trial program at Wheeler National Wildlife Refuge costs approximately \$2,000 annually. Minor amounts of personnel time associated with the issuing of permits and law enforcement activities would be required. No offsetting revenues for Chase Only Field Trials are collected.

Anticipated Impacts of the Use: The following anticipated impacts were identified and evaluated based on professional judgment.

Short-term Impacts: Low level impacts may include trampling of vegetation and temporary disturbance to wildlife species in the area during the activity. Other impacts include littering and impacts from free roaming dogs that were not retrieved immediately after the cast. These dogs are usually retrieved within 24 hours. It is not anticipated that these impacts would be permanent or long-lasting.

Long-term Impacts: Current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced or are anticipated to be experienced.

Cumulative Impacts: No cumulative impacts are anticipated.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler National Wildlife Refuge Complex, which was announced in the Federal Register on April 5, 2007 (72 FR 16811) and made available for public comment for 45 days until May 21, 2007. Methods used to solicit public review and comment included posted notices at refuge headquarters and area locations; copies of the draft comprehensive conservation plan distributed to adjacent landowners, the public, and local, state, and federal agencies; public meetings; and news releases to area newspapers. Appendix D summarizes the public comments.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Field trial clubs are required to obtain both a refuge special use permit and a State field trial permit. Special use permits will contain specific conditions to ensure compatibility. Participants are required to conform to State laws and refuge regulations. No firearms, saws, or axes will be carried or used on the refuge and raccoons will be left in trees unharmed. Dogs are not allowed to come in contact with raccoons or foxes. This activity will not be permitted during certain times of the year and areas are closed seasonally for wildlife purposes. Law enforcement efforts will be conducted to ensure compliance with State laws and refuge regulations. Periodic review of these activities will assure that wildlife disturbance does not become a factor in critical wildlife use areas.

Justification: Many local field trial clubs do not have adequate lands to conduct field trials. Chase open field trials are a low impact activity that have no long-term or cumulative effects and can be managed within existing refuge resources. They do not materially interfere with, or detract from, refuge goals, objectives, or refuge management activities; adversely affect refuge biological resources; or, conflict with wildlife-dependent priority public uses. Therefore, they are an acceptable form of wildlife-dependent recreation.

NEPA Compliance for Refuge Use Description: *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-year Re-evaluation Date: July 1, 2017

Description of Use: Bicycling – Key Cave National Wildlife Refuge

Bicycle riding is not one of the six priority public wildlife-dependent uses of the National Wildlife Refuge System, but is a popular activity at national wildlife refuges. Bicycle riding can occur year-round on a limited basis on refuge gravel roads. Bicyclists travel refuge gravel roads as a chance to observe nature in relative safety away from fast moving cars and trucks.

Availability of Resources: A bicycling program at Key Cave National Wildlife Refuge would not cost any additional funds. No additional resources are required to administer this use. Monitoring and compliance can be handled within existing resources, programs, and staff time. This use does not require any special facilities or improvements to any existing facilities.

Anticipated Impacts of the Use: The following anticipated impacts were identified and evaluated based on professional judgment.

Short-term Impacts: Short-term impacts associated with this use involve littering, minor vegetation disturbance on roadsides, and wildlife disturbance caused by the passage of bicyclists. On rare occasions, riders may illegally leave roadways and cause short-term habitat degradation as a result of trampling of vegetation and soil compaction. And, occasional collisions with wildlife are possible. Since riding is confined to existing gravel roadways open to public access, it is not anticipated that this use would significantly impact refuge resources. No long-term or cumulative impacts are anticipated.

Long-term Impacts: Current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced or are anticipated to be experienced.

Cumulative Impacts: No cumulative impacts are anticipated.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler National Wildlife Refuge Complex, which was announced in the Federal Register on April 5, 2007 (72 FR 16811) and made available for public comment for 45 days until May 21, 2007. Methods used to solicit public review and comment included posted notices at refuge headquarters and area locations; copies of the draft comprehensive conservation plan distributed to adjacent landowners, the public, and local, state, and federal agencies; public meetings; and news releases to area newspapers. Appendix D summarizes the public comments.

Determination (check one below):

- Use is Not Compatible
 Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Bicycling is restricted to gravel roads open to public access. Users must observe refuge regulations.

Justification: Bicycling on refuge gravel roads is a low impact activity that can be managed within existing refuge resources. Bicycling, in fact, is less deleterious to refuge roads and infrastructure than vehicles. It is deemed a wildlife-oriented activity by virtue of the fact that observation of wildlife is an expected or anticipated part of the experience.

NEPA Compliance for Refuge Use Description: *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- year Re-evaluation Date: July 1, 2017

Approval of Compatibility Determinations

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

Refuge Manager: **|| S ||** 06/18/2007
(Signature/Date)

Regional Compatibility Coordinator: **|| S ||** 7/9/07
(Review Signature/Date)

Refuge Supervisor: **|| S ||** 7/16/07
(Review Signature/Date)

Regional Chief, National Wildlife Refuge System, Southeast Region: **|| S ||** 7-19-07
(Concurrence Signature/Date)

Appendix G. Intra-Service Section 7 Biological Evaluation

Originating Person: John Beck
Telephone Number: 256/353-7243, Ext. 32
E-Mail: john_beck@fws.gov
Date: 09/30/06

PROJECT NAME: Wheeler National Wildlife Refuge Complex Comprehensive Conservation Plan

I. Service Program:

- Ecological Services
- Federal Aid
- Clean Vessel Act
- Coastal Wetlands
- Endangered Species Section 6
- Partners for Fish and Wildlife
- Sport Fish Restoration
- Wildlife Restoration
- Fisheries
- Refuges/Wildlife

II. State/Agency: Alabama/Fish and Wildlife Service

III. Station Name: Wheeler National Wildlife Refuge Complex (Wheeler Complex)

IV. Description of Proposed Action: Implementation of the Comprehensive Conservation Plan for Wheeler Complex by adopting the proposed alternative, Alternative D, which will provide guidance, management direction, and operation plans for the next 15 years. The CCP for the Wheeler Complex covers four national wildlife refuges: Wheeler, Key Cave, Sauta Cave, and Fern Cave.

The plan's overriding consideration is to carry out the purposes for which each refuge in the Complex was established. Fish and wildlife are the first priority in refuge management, and public use (wildlife-dependent recreation) is allowed and encouraged as long as it is compatible with, or does not detract from, the mission and purposes of each refuge.

Individual consultations will occur under Section 7 for projects related to endangered species and are not intended to be covered in this document. This CCP prioritizes wildlife and habitat management, and proposes wildlife-dependent, compatible recreational opportunities.

Chapter IV4 of the CCP outlines specific goals, objectives, and strategies to achieve an expanded wildlife and habitat management approach, while optimizing (making the best use of) public use and environmental education opportunities. While seeking concurrences on the general management direction of the Wheeler Complex, as stated previously, individual consultations will occur for projects specifically related to endangered species and critical habitat.

V. Pertinent Species and Habitat:

- A. Wheeler NWR - Historical records indicate that the Ring Pink (*Obovaria retusa*) (1904), Slabside Pearlymussel (*Lexingtonia dolabelloides*), and the Fine-rayed Pigtoe (*Fusconaia cuneolus*) (1925) occurred within the boundaries of the Wheeler NWR. More recent surveys have shown that these species have been extirpated and will not be covered in this biological evaluation.

The following species have been documented on or in close proximity to Wheeler NWR: gray bat (*Myotis grisescens*), Anthony's riversnail (*Athearnia anthonyi*), armored snail (*Pyrgulopsis pachyta*), pink mucket (*Lampsilis abrupta*), rough pigtoe (*Pleurobema plenum*), slender campeloma (*Campeloma decampi*), bald eagle (*Haliaeetus leucocephalus*) and American Alligator (*Alligator mississippiensis*).

Gray bats use Cave Springs Cave as a maternity colony and have averaged 12,500 bats since 1997. Anthony's riversnail and the armored snail have been documented in Limestone and Piney Creeks. The pink mucket and rough pigtoe are found in the Tennessee River and the slender campeloma has been documented just outside the refuge boundary.

Bald eagles utilize Wheeler NWR mostly during the winter months for foraging. Usually only one or two are seen annually in open fields, moist-soils unit, and along the shores and mudflats of the Tennessee River. In July 2006, two active nests were found near an area called Suzie Hole along the Tennessee River. The entire Wheeler NWR is potential foraging and/or nesting habitat for the bald eagle.

The American alligator, which is listed as "Threatened Due to Similarity of Appearance to the American Crocodile" is also found on the refuge. Evidence of reproduction has been seen in five of the last seven years.

Key Cave NWR: Key Cave NWR is the only known location of the Alabama cavefish (*Speoplatyrhinus poulsoni*), a small blind colorless fish which inhabits the underground pools in Key Cave. The cave is also a priority one maternity cave for the endangered gray bat. Gray bat emergence counts are conducted annually at Key Cave and have averaged 33,400 gray bats since 1997. Approximately 5,000 young gray bats are produced annually by this maternity colony.

Sauta Cave NWR: Sauta Cave provides crucial habitat for gray and Indiana bats. The cave provides a summer roosting site for about 300,000 - 400,000 gray bats and a winter hibernaculum for both bats. In addition, a relatively large (>250 individuals) population of Price's potato-bean (*Apios priceana*) is found on the refuge.

Fern Cave NWR: Fern Cave contains the largest wintering colony of gray bats in the United States with over one million bats hibernating there in the winter. Bat experts also think that as many as one million Indiana bats may be using the cave. However, in the most recent survey of 2003, no Indiana bats were observed. The American's Harts-tongue fern (*Phyllitis scolopendrum var. americana*) has been documented on Fern Cave NWR.

Table 1. Listed species found on the Wheeler Complex

| SPECIES/CRITICAL HABITAT | STATUS ¹ |
|---|---------------------|
| Gray Bat (<i>Myotis grisescens</i>) ^{2,3,4,5} | E |
| Indiana Bat (<i>Myotis sodalis</i>) ^{4,5} | E |
| Anthony's Riversnail (<i>Athearnia anthonyi</i>) ² | E |
| Armored Snail (<i>Pyrgulopsis pachyta</i>) ² | E |
| Pink Mucket (Pearlymussel) (<i>Lampsilis abrupta</i>) ² | E |
| Rough Pigtoe (<i>Pleurobema plenum</i>) ² | E |
| Slender Campeloma (<i>Campeloma decampi</i>) ² | E |
| Alabama cavefish (<i>Speoplatyrhinus poulsoni</i>) ³ | E/CH |
| Bald Eagle (<i>Haliaeetus leucocephalus</i>) ² | T |
| American Hart's-Tongue Fern (<i>Phyllitis scolopendrum var. americana</i>) ⁵ | T |
| Price's Potato-Bean (<i>Apios priceana</i>) ⁴ | T |
| American Alligator (<i>Alligator mississippiensis</i>) ² | S/A |

¹Status: E=endangered, T=threatened, PE=proposed endangered, PT=proposed threatened, CH=critical habitat, PCH=proposed critical habitat, C=candidate species, S/A=Similar Appearance

²Location: Wheeler NWR

³Location: Key Cave NWR

⁴Location: Sauta Cave NWR

⁵Location: Fern Cave NWR

VI. Location:

A. Ecoregion Number and Name: Lower Tennessee-Cumberland No. 28

B. County and State: Lauderdale, Limestone, Jackson, Madison, and Morgan Counties, Alabama

Section, township, and range (or latitude and longitude: Wheeler NWR (N34° 33' 25.71" latitude, W86° 50' 36.87" longitude), Key Cave NWR (N34° 45' 15.57" latitude, W87° 47' 13.66" longitude), Sauta Cave NWR (N34° 36' 47.20" latitude, W86° 7' 55.05" longitude) and Fern Cave NWR (N34° 40' 9.29" latitude, W86° 18' 32.85" longitude).

Distance (miles) and direction to nearest town: Wheeler NWR is located between Decatur and Huntsville in the Tennessee River Valley of northern Alabama. The refuge headquarters office is located on U.S. Highway 67, 3.5 miles west of I-65 and 3 miles east of Decatur, Alabama.

Key Cave NWR is located about 5 miles southwest of Florence, Alabama. From Florence, take Alabama State Route 20, turn west on Lauderdale County Route 2. Follow Route 2 for about 4 miles and turn south on Lauderdale County Route 223. Follow Route 223 for about 1.5 miles and turn west on Lauderdale County Route 204. Follow Route 204 for 0.25 miles. The refuge is located on the south side of the road.

Sauta Cave NWR is located just above the Sauty Creek embayment of TVA's Guntersville Reservoir, 7 miles west of Scottsboro, Alabama on U.S. Highway 72.

Fern Cave NWR is located 2 miles east of Paint Rock, Alabama. From Huntsville, take U.S. 72 east to Gurley. Southeast of Gurley, turn left on County Road 500 just past where U.S. 72 crosses the Paint Rock River. County Road 500 is closed at a gate but access by foot traffic is still allowed. Follow the old road as it winds along the Paint Rock River and look for national wildlife refuge signs.

E. Species/habitat occurrence: N/A

VII. Determination of Effects:

Explanation of effects of the action on species and critical habitats in item V. B:

| SPECIES/ CRITICAL HABITAT | IMPACTS TO SPECIES/CRITICAL HABITAT |
|------------------------------|-------------------------------------|
| Gray bat | No negative impacts foreseen |
| Indiana bat | No negative impacts foreseen |
| Anthony's riversnail | No negative impacts foreseen |
| Armored snail | No negative impacts foreseen |
| Pink mucket | No negative impacts foreseen |
| Rough pigtoe | No negative impacts foreseen |
| Slender campeloma | No negative impacts foreseen |
| Alabama cavefish | No negative impacts foreseen |
| Bald eagle | No negative impacts foreseen |
| American Hart's-tongue fern | No negative impacts foreseen |
| Price's potato-bean | No negative impacts foreseen |
| American alligator | No negative impacts foreseen |

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

| SPECIES/CRITICAL HABITAT | ACTIONS TO MITIGATE/MINIMIZE IMPACTS |
|---------------------------------|---|
| Gray bat | None |
| Indiana bat | None |
| Anthony's riversnail | None |
| Armored snail | None |
| Pink mucket | None |
| Rough pigtoe | None |
| Slender campeloma | None |
| Alabama cavefish | None |
| Bald eagle | None |
| American Hart's-tongue fern | None |
| Price's potato-bean | None |
| American alligator | None |

VIII. Effect Determination and Response Requested:

| SPECIES/CRITICAL HABITAT | DETERMINATION1 | | | REQUESTED |
|---------------------------------|-----------------------|-----------|-----------|------------------|
| | NE | NA | AA | |
| Gray bat | | NA | | Concurrence |
| Indiana bat | | NA | | Concurrence |
| Anthony's riversnail | NE | | | Concurrence |
| Armored snail | NE | | | Concurrence |
| Pink mucket | NE | | | Concurrence |
| Rough pigtoe | NE | | | Concurrence |

| SPECIES/CRITICAL HABITAT | DETERMINATION ¹ | | | REQUESTED |
|-----------------------------|----------------------------|----|--|-------------|
| | | | | |
| Slender campeloma | NE | | | Concurrence |
| Alabama cavefish | | NA | | Concurrence |
| Bald Eagle | | NA | | Concurrence |
| American Hart's-tongue Fern | | NA | | Concurrence |
| Price's potato-bean | | NA | | Concurrence |
| American Alligator | NE | | | 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 and candidate species is "Conference".

II S II

Signature (originating station)

Deputy Project Leader

Title

Date

9/30/06

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):

II S II

Signature

Field Supervisor

Title

Date

12/27/06

Daphne Field Office

Office

Appendix H. Wilderness Review

The Wilderness Act of 1964 defines a Wilderness Area as an area of Federal land that retains its primeval character and influence, without permanent improvements or human inhabitation, and is managed so as to preserve its natural conditions and which:

- generally appears to have been influenced primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- has outstanding opportunities for solitude or primitive and unconfined types of recreation;
- has at least 5,000 contiguous roadless acres or is of sufficient size to make practicable its preservation and use in an unimpeded condition or is a roadless island, regardless of size;
- does not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or its wilderness character could be restored through appropriate management at the time of review; and
- may contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

The lands within Wheeler National Wildlife Refuge Complex were reviewed for their suitability in meeting the criteria for Wilderness, as defined by the Wilderness Act of 1964. No lands in the Refuge Complex were found to meet these criteria. Therefore, the suitability of refuge lands for wilderness designation is not further analyzed in this plan.

Appendix I. Refuge Biota

WHEELER NATIONAL WILDLIFE REFUGE COMPLEX BIRD LIST

| | |
|---|--|
| <p>Seasonal Appearance</p> <p>Sp Spring March – May</p> <p>S Summer June - August</p> <p>F Fall September - November</p> <p>W Winter December - February</p> <p>Additional Information</p> <p>* - nests on the Complex</p> <p>I - Introduced species</p> | <p>Seasonal Abundance</p> <p>a - abundant (common species, very numerous)</p> <p>c - common (certain to be seen in suitable habitat)</p> <p>f - fairly common (occurs annually)</p> <p>u - uncommon (present but not certain to be seen)</p> <p>v - vagrant (less than ten valid records in last decade)</p> <p>x - accidental (less than three valid records)</p> <p>r - rare (seen at irregular intervals 2 to 5 years)</p> <p>h - historical (species occurring formerly)</p> |
|---|--|

Locations: W – Wheeler NWR; K – Key Cave NWR; S – Sauta Cave NWR; F – Fern Cave NWR; V – Vicinity/Off Refuges, C – Complex Area (all refuges)

| Common Name | Scientific Name | Location | Sp | Su | F | W |
|------------------------------|-------------------------------|----------|----|----|---|---|
| Black-bellied Whistling-Duck | <i>Dendrocygna autumnalis</i> | W | - | - | - | x |
| Fulvous Whistling-Duck | <i>Dendrocygna bicolor</i> | W | - | - | - | x |
| Greater White-fronted Goose | <i>Anser albifrons</i> | W, K | r | | f | f |
| Snow Goose | <i>Chen caerulescens</i> | W, K | - | - | f | f |
| Ross' Goose | <i>Chen rossii</i> | W | - | - | f | f |
| Cackling Goose | <i>Branta hutchinsii</i> | W | - | - | - | v |
| Canada Goose* | <i>Branta canadensis</i> | W, K | f | u | a | a |
| Brant | <i>Branta bernicla</i> | W | - | - | x | x |
| Barnacle Goose | <i>Branta leucopsis</i> | W | - | - | x | x |
| Mute Swan (I) | <i>Cygnus olor</i> | W | - | x | x | - |
| Tundra Swan | <i>Cygnus columbianus</i> | W | r | - | r | r |
| Wood Duck* | <i>Aix sponsa</i> | W, K | c | c | c | c |
| Gadwall | <i>Anas strepera</i> | W, K | c | v | c | a |
| Eurasian Wigeon | <i>Anas penelope</i> | W | - | - | v | v |
| American Wigeon | <i>Anas americana</i> | W, K | c | - | a | a |
| American Black Duck* | <i>Anas rubripes</i> | W, K | f | u | c | c |

| Common Name | Scientific Name | Location | Sp | Su | F | W |
|------------------------|----------------------------------|----------|----|----|---|---|
| Mallard* | <i>Anas platyrhynchos</i> | W, K | c | f | a | a |
| Blue-winged Teal | <i>Anas discors</i> | W, K | c | r | c | r |
| Cinnamon Teal | <i>Anas cyanoptera</i> | V | - | - | x | - |
| Northern Shoveler | <i>Anas clypeata</i> | W, K | c | v | c | c |
| Northern Pintail | <i>Anas acuta</i> | W, K | u | v | c | c |
| Green-winged Teal | <i>Anas crecca</i> | W, K | c | - | c | c |
| Canvasback | <i>Aythya valisineria</i> | W | f | - | c | c |
| Redhead | <i>Aythya americana</i> | W, K | f | - | c | u |
| Ring-necked Duck | <i>Aythya collaris</i> | W, K | c | - | c | c |
| Greater Scaup | <i>Aythya marila</i> | W | u | - | u | u |
| Lesser Scaup | <i>Aythya affinis</i> | W, K | c | - | c | c |
| King Eider | <i>Somateria spectabilis</i> | V | - | - | - | x |
| Harlequin Duck | <i>Histrionicus histrionicus</i> | V | - | - | - | x |
| Surf Scoter | <i>Melanitta perspicillata</i> | W | - | - | x | x |
| White-winged Scoter | <i>Melanitta fusca</i> | W | v | - | v | v |
| Black Scoter | <i>Melanitta nigra</i> | W | - | - | - | x |
| Long-tailed Duck | <i>Clangula hyemalis</i> | W | v | - | v | v |
| Bufflehead | <i>Bucephala albeola</i> | W, K | c | - | c | c |
| Common Goldeneye | <i>Bucephala clangula</i> | W | c | - | c | c |
| Hooded Merganser* | <i>Lophodytes cucullatus</i> | W, K | f | u | c | c |
| Common Merganser | <i>Mergus merganser</i> | W | r | - | r | r |
| Red-breasted Merganser | <i>Mergus serrator</i> | W | f | - | f | u |
| Ruddy Duck | <i>Oxyura jamaicensis</i> | W | c | - | c | c |
| Wild Turkey* | <i>Meleagris gallopavo</i> | W, K | u | u | u | u |
| Northern Bobwhite* | <i>Colinus virginianus</i> | W, K | f | f | f | f |
| Red throated Loon | <i>Gavia stellata</i> | W | v | - | - | v |
| Common Loon | <i>Gavia immer</i> | W | f | v | f | c |

| Common Name | Scientific Name | Location | Sp | Su | F | W |
|-----------------------------|----------------------------------|----------|----|----|---|---|
| Pied-billed Grebe* | <i>Podilymbus podiceps</i> | W, K | c | u | c | a |
| Horned Grebe | <i>Podiceps auritus</i> | W, K | f | - | f | c |
| Red-necked Grebe | <i>Podiceps grisegena</i> | W | - | - | x | x |
| Eared Grebe | <i>Podiceps nigricollis</i> | W | x | - | - | - |
| American White Pelican | <i>Pelecanus erythrorhynchos</i> | W | u | - | f | r |
| Brown Pelican | <i>Pelecanus occidentalis</i> | V | - | - | x | x |
| Double-Crested Cormorant | <i>Phalacrocorax auritus</i> | W, K | c | u | c | c |
| Anhinga | <i>Anhinga anhinga</i> | W | h | h | h | - |
| American Bittern | <i>Botaurus lentiginosus</i> | W | u | - | u | - |
| Least Bittern | <i>Ixobrychus exilis</i> | W | r | r | r | - |
| Great Blue Heron* | <i>Ardea herodias</i> | W, K | c | u | a | a |
| Great Egret* | <i>Ardea alba</i> | W, K | f | u | f | f |
| Snowy Egret | <i>Egretta thula</i> | W | r | r | r | - |
| Little Blue Heron | <i>Egretta caerulea</i> | W, K | f | f | u | - |
| Tricolored Heron | <i>Egretta tricolor</i> | W | r | r | - | - |
| Cattle Egret | <i>Bubulcus ibis</i> | W | c | c | f | x |
| Green Heron* | <i>Butorides virescens</i> | W, K | c | c | f | x |
| Black-crowned Night-Heron | <i>Nycticorax nycticorax</i> | W | u | u | f | u |
| Yellow-crowned Night-Heron* | <i>Nyctanassa violacea</i> | W | f | f | u | - |
| White Ibis | <i>Eudocimus albus</i> | W | v | r | u | - |
| Glossy Ibis | <i>Plegadis falcinellus</i> | W | - | - | v | x |
| Wood Stork | <i>Mycteria americana</i> | W | h | h | h | - |
| Black Vulture* | <i>Coragyps atratus</i> | C | u | u | u | u |
| Turkey Vulture* | <i>Cathartes aura</i> | C | u | u | u | u |
| Osprey* | <i>Pandion haliaetus</i> | W | u | f | u | u |
| Mississippi Kite | <i>Ictinia mississippiensis</i> | W | r | r | r | - |

| Common Name | Scientific Name | Location | Sp | Su | F | W |
|------------------------|-----------------------------------|----------|----|----|---|---|
| Bald Eagle* | <i>Haliaeetus leucocephalus</i> | W, K | u | r | u | u |
| Northern Harrier | <i>Circus cyaneus</i> | W, K | u | - | f | c |
| Sharp-shinned Hawk* | <i>Accipiter striatus</i> | C | f | r | f | f |
| Cooper's Hawk* | <i>Accipiter cooperii</i> | C | u | r | u | u |
| Red-shouldered Hawk* | <i>Buteo lineatus</i> | W, K, S | f | u | f | u |
| Broad-winged Hawk* | <i>Buteo platypterus</i> | W, K, S | f | u | c | - |
| Swainson's Hawk | <i>Buteo swainsoni</i> | W | - | - | - | x |
| Red-tailed Hawk* | <i>Buteo jamaicensis</i> | W, K, S | c | u | c | a |
| Rough-legged Hawk | <i>Buteo lagopus</i> | W | - | - | v | v |
| Golden Eagle | <i>Aquila chrysaetos</i> | W | - | - | v | v |
| American Kestrel* | <i>Falco sparverius</i> | W, K | f | r | c | c |
| Merlin | <i>Falco columbarius</i> | W | r | - | r | v |
| Peregrine Falcon | <i>Falco peregrinus</i> | W | r | - | u | r |
| Yellow Rail | <i>Coturnicops noveboracensis</i> | W | x | - | x | - |
| Black Rail | <i>Laterallus jamaicensis</i> | V | - | - | x | - |
| King Rail | <i>Rallus elegans</i> | W | v | v | v | v |
| Virginia Rail | <i>Rallus limicola</i> | W | u | - | u | - |
| Sora | <i>Porzana carolina</i> | W, K | u | - | u | - |
| Purple Gallinule | <i>Porphyrio martinica</i> | W | v | v | - | - |
| Common Moorhen | <i>Gallinula chloropus</i> | W | v | v | v | - |
| American Coot* | <i>Fulica americana</i> | W, K | a | u | a | a |
| Sandhill Crane | <i>Grus canadensis</i> | W | - | - | f | f |
| Whooping Crane | <i>Grus americana</i> | W | - | - | - | x |
| Black-bellied Plover | <i>Pluvialis squatarola</i> | W | u | - | u | - |
| American Golden-Plover | <i>Pluvialis dominica</i> | W | u | - | u | - |
| Semipalmated Plover | <i>Charadrius semipalmatus</i> | W, K | c | - | c | - |
| Piping Plover | <i>Charadrius melodus</i> | W | h | - | h | - |

| Common Name | Scientific Name | Location | Sp | Su | F | W |
|-------------------------|------------------------------------|----------|----|----|---|---|
| Killdeer* | <i>Charadrius vociferus</i> | W, K | a | c | a | a |
| Black-necked Stilt | <i>Himantopus mexicanus</i> | W | v | - | v | - |
| American Avocet | <i>Recurvirostra americana</i> | W | - | - | f | - |
| Greater Yellowlegs | <i>Tringa melanoleuca</i> | W, K | c | u | c | f |
| Lesser Yellowlegs | <i>Tringa flavipes</i> | W, K | c | u | c | u |
| Solitary Sandpiper | <i>Tringa solitaria</i> | W | f | u | f | - |
| Willet | <i>Catoptrophorus semipalmatus</i> | W | v | - | v | v |
| Spotted Sandpiper* | <i>Actitis macularius</i> | W, K | c | u | c | r |
| Upland Sandpiper | <i>Bartramia longicauda</i> | W, K | r | - | r | - |
| Whimbrel | <i>Numenius phaeopus</i> | W | v | - | v | - |
| Hudsonian Godwit | <i>Limosa haemastica</i> | W | v | - | v | - |
| Marbled Godwit | <i>Limosa fedoa</i> | W | v | - | - | - |
| Ruddy Turnstone | <i>Arenaria interpres</i> | W | r | - | r | - |
| Red Knot | <i>Calidris canutus</i> | W | - | - | v | - |
| Sanderling | <i>Calidris alba</i> | W | r | - | u | - |
| Semipalmated Sandpiper | <i>Calidris pusilla</i> | W, K | c | u | c | - |
| Western Sandpiper | <i>Calidris mauri</i> | W | f | u | f | x |
| Least Sandpiper | <i>Calidris minutilla</i> | W, K | c | u | c | c |
| White-rumped Sandpiper | <i>Calidris fuscicollis</i> | W, K | u | r | r | - |
| Baird's Sandpiper | <i>Calidris bairdii</i> | W | r | - | r | - |
| Pectoral Sandpiper | <i>Calidris melanotos</i> | W, K | c | r | c | - |
| Dunlin | <i>Calidris alpina</i> | W, K | f | - | f | u |
| Stilt Sandpiper | <i>Calidris himantopus</i> | W | u | - | u | - |
| Buff-breasted Sandpiper | <i>Tryngites subruficollis</i> | W | r | - | u | - |
| Short-billed Dowitcher | <i>Limnodromus griseus</i> | W | f | - | f | - |
| Long-billed Dowitcher | <i>Limnodromus scolopaceus</i> | W | u | - | u | - |
| Wilson's Snipe | <i>Gallinago delicata</i> | W, K | c | r | c | c |

| Common Name | Scientific Name | Location | Sp | Su | F | W |
|----------------------------|----------------------------------|----------|----|----|---|---|
| American Woodcock* | <i>Scolopax minor</i> | W, K | u | u | u | u |
| Wilson's Phalarope | <i>Phalaropus tricolor</i> | W, K | r | - | u | - |
| Red-necked Phalarope | <i>Phalaropus lobatus</i> | W | - | - | x | - |
| Red Phalarope | <i>Phalaropus fulicarius</i> | V | - | - | x | - |
| Pomarine Jaeger | <i>Stercorarius pomarinus</i> | W | - | - | - | x |
| Laughing Gull | <i>Larus atricilla</i> | W | r | r | r | r |
| Franklin's Gull | <i>Larus pipixcan</i> | W | v | v | v | v |
| Bonaparte's Gull | <i>Larus philadelphia</i> | W | c | - | f | c |
| Ring-billed Gull | <i>Larus delawarensis</i> | W, K | a | u | a | a |
| Herring Gull | <i>Larus argentatus</i> | W | f | r | c | c |
| Glaucous Gull | <i>Larus hyperboreus</i> | W | - | - | - | x |
| Great Black-backed Gull | <i>Larus marinus</i> | V | - | - | - | x |
| Sabine's Gull | <i>Xema sabini</i> | W | - | - | x | - |
| Caspian Tern | <i>Sterna caspia</i> | W | u | r | u | - |
| Common Tern | <i>Sterna hirundo</i> | W | u | - | u | - |
| Forster's Tern | <i>Sterna forsteri</i> | W | c | r | c | u |
| Least Tern | <i>Sterna antillarum</i> | W | r | r | r | - |
| Black Tern | <i>Chlidonias niger</i> | W | f | u | c | - |
| Rock Pigeon* (I) | <i>Columba livia</i> | W, K | a | a | a | a |
| Eurasian Collared-Dove (I) | <i>Streptopelia decaocto</i> | W, K | u | u | u | u |
| Mourning Dove* | <i>Zenaida macroura</i> | C | a | a | a | a |
| Common Ground Dove | <i>Columbina passerina</i> | W | v | v | v | v |
| Black-billed Cuckoo | <i>Coccyzus erythrophthalmus</i> | W | u | - | u | - |
| Yellow-billed Cuckoo* | <i>Coccyzus americanus</i> | C | c | c | c | - |
| Barn Owl* | <i>Tyto alba</i> | W | u | u | u | u |
| Eastern Screech-Owl* | <i>Megascops asio</i> | W, K | c | c | c | c |
| Great Horned Owl* | <i>Bubo virginianus</i> | W, K | f | f | f | f |

| Common Name | Scientific Name | Location | Sp | Su | F | W |
|----------------------------|-----------------------------------|----------|----|----|---|---|
| Barred Owl* | <i>Strix varia</i> | W, K | u | u | u | u |
| Short-eared Owl | <i>Asio flammeus</i> | W, K | v | - | v | r |
| Northern Saw-whet Owl | <i>Aegolius acadicus</i> | W | - | - | - | x |
| Common Nighthawk* | <i>Chordeiles minor</i> | W, K | u | u | u | - |
| Chuck-will's-widow* | <i>Caprimulgus carolinensis</i> | C | c | c | u | - |
| Whip-poor-will | <i>Caprimulgus vociferus</i> | C | u | - | u | - |
| Chimney Swift* | <i>Chaetura pelagica</i> | W, K | c | c | a | - |
| Ruby-throated Hummingbird* | <i>Archilochus colubris</i> | C | c | c | c | - |
| Rufous Hummingbird | <i>Selasphorus rufus</i> | V | - | - | x | - |
| Belted Kingfisher* | <i>Ceryle alcyon</i> | W, K | f | u | c | c |
| Red-headed Woodpecker* | <i>Melanerpes erythrocephalus</i> | W, K | u | u | u | u |
| Red-bellied Woodpecker* | <i>Melanerpes carolinus</i> | C | c | c | c | c |
| Yellow-bellied Sapsucker | <i>Sphyrapicus varius</i> | C | f | - | c | c |
| Downy Woodpecker* | <i>Picoides pubescens</i> | C | c | c | c | c |
| Hairy Woodpecker* | <i>Picoides villosus</i> | C | f | f | f | f |
| Northern Flicker* | <i>Colaptes auratus</i> | C | c | c | c | c |
| Pileated Woodpecker* | <i>Dryocopus pileatus</i> | C | f | f | f | f |
| Olive-sided Flycatcher | <i>Contopus cooperi</i> | W, K | u | - | u | - |
| Eastern Wood-Pewee* | <i>Contopus virens</i> | C | c | f | c | - |
| Yellow-bellied Flycatcher | <i>Empidonax flaviventris</i> | W, K | v | - | v | - |
| Acadian Flycatcher* | <i>Empidonax virescens</i> | W, K, S | u | u | u | - |
| Alder Flycatcher | <i>Empidonax alnorum</i> | W | v | - | v | - |
| Willow Flycatcher* | <i>Empidonax traillii</i> | W | r | r | f | - |
| Least Flycatcher | <i>Empidonax minimus</i> | W | r | - | r | - |
| Eastern Phoebe* | <i>Sayornis phoebe</i> | C | c | c | c | c |
| Vermillion Flycatcher | <i>Pyrocephalus rubinus</i> | W | - | - | x | x |
| Ash-throated Flycatcher | <i>Myiarchus cinerascens</i> | W | - | - | x | - |

| Common Name | Scientific Name | Location | Sp | Su | F | W |
|--------------------------------|-----------------------------------|----------|----|----|---|---|
| Great Crested Flycatcher* | <i>Myiarchus crinitus</i> | C | c | c | u | - |
| Eastern Kingbird* | <i>Tyrannus tyrannus</i> | W, K | c | c | c | - |
| Scissor-tailed Flycatcher | <i>Tyrannus forficatus</i> | W | u | u | x | - |
| Loggerhead Shrike* | <i>Lanius ludovicianus</i> | W, K | u | u | u | u |
| White-eyed Vireo* | <i>Vireo griseus</i> | W, K, S | c | f | c | - |
| Yellow-throated Vireo* | <i>Vireo flavifrons</i> | C | f | u | f | - |
| Blue-headed Vireo | <i>Vireo solitarius</i> | W, K | u | - | u | u |
| Warbling Vireo | <i>Vireo gilvus</i> | W | v | - | v | - |
| Philadelphia Vireo | <i>Vireo philadelphicus</i> | W | u | - | u | - |
| Red-eyed Vireo* | <i>Vireo olivaceus</i> | C | c | f | c | - |
| Blue Jay* | <i>Cyanocitta cristata</i> | C | c | c | c | c |
| American Crow* | <i>Corvus brachyrhynchos</i> | W, K | f | u | f | a |
| Horned Lark* | <i>Eremophila alpestris</i> | W, K | c | f | c | a |
| Purple Martin* | <i>Progne subis</i> | W, K | c | c | u | - |
| Tree Swallow* | <i>Tachycineta bicolor</i> | W, K | c | f | c | - |
| Northern Rough-winged Swallow* | <i>Stelgidopteryx serripennis</i> | W, K, S | c | f | c | x |
| Bank Swallow | <i>Riparia riparia</i> | W, K | c | r | c | - |
| Cliff Swallow* | <i>Petrochelidon pyrrhonota</i> | W, K | f | f | u | - |
| Barn Swallow* | <i>Hirundo rustica</i> | W, K | c | c | c | x |
| Carolina Chickadee* | <i>Poecile carolinensis</i> | C | c | c | c | c |
| Tufted Titmouse* | <i>Baeolophus bicolor</i> | C | c | c | c | c |
| Red-breasted Nuthatch | <i>Sitta canadensis</i> | W, K | u | - | u | u |
| White-breasted Nuthatch* | <i>Sitta carolinensis</i> | W, S, F | f | f | f | f |
| Brown-headed Nuthatch | <i>Sitta pusilla</i> | W | v | - | v | v |
| Brown Creeper | <i>Certhia americana</i> | C | u | - | f | c |
| Carolina Wren* | <i>Thryothorus ludovicianus</i> | C | c | c | c | c |

| Common Name | Scientific Name | Location | Sp | Su | F | W |
|------------------------|--------------------------------|----------|----|----|---|---|
| Bewick's Wren | <i>Thryomanes bewickii</i> | W | h | h | h | h |
| House Wren | <i>Troglodytes aedon</i> | W, K | f | r | f | r |
| Winter Wren | <i>Troglodytes troglodytes</i> | W, K, S | u | - | u | f |
| Sedge Wren | <i>Cistothorus platensis</i> | W, K | u | - | u | x |
| Marsh Wren | <i>Cistothorus palustris</i> | W | u | - | u | r |
| Golden-crowned Kinglet | <i>Regulus satrapa</i> | W, K | f | - | c | c |
| Ruby-crowned Kinglet | <i>Regulus calendula</i> | C | c | - | c | c |
| Blue-gray Gnatcatcher* | <i>Poliophtila caerulea</i> | C | c | f | c | r |
| Eastern Bluebird* | <i>Sialia sialis</i> | W, K | c | c | c | c |
| Veery | <i>Catharus fuscescens</i> | W | f | - | f | - |
| Gray-cheeked Thrush | <i>Catharus ustulatus</i> | W | u | - | f | - |
| Swainson's Thrush | <i>Catharus minimus</i> | W, K | f | - | f | - |
| Hermit Thrush | <i>Catharus guttatus</i> | W, K, S | u | - | f | f |
| Wood Thrush* | <i>Hylocichla mustelina</i> | C | c | c | c | - |
| American Robin* | <i>Turdus migratorius</i> | W, K | a | c | c | a |
| Gray Catbird* | <i>Dumetella carolinensis</i> | W, K, S | c | c | c | r |
| Northern Mockingbird* | <i>Mimus polyglottos</i> | W, K | c | c | c | c |
| Brown Thrasher* | <i>Toxostoma rufum</i> | W, K | c | c | c | c |
| European Starling* (I) | <i>Sturnus vulgaris</i> | W, K | a | a | a | a |
| American Pipit | <i>Anthus rubescens</i> | W, K | f | - | c | c |
| Cedar Waxwing | <i>Bombycilla cedrorum</i> | W, K | c | r | c | a |
| Blue-winged Warbler | <i>Vermivora pinus</i> | W, K | u | - | f | - |
| Golden-winged Warbler | <i>Vermivora chrysoptera</i> | W | u | - | u | - |
| Tennessee Warbler | <i>Vermivora peregrina</i> | W, K | c | - | c | - |
| Orange-crowned Warbler | <i>Vermivora celata</i> | W, K | f | - | f | u |
| Nashville Warbler | <i>Vermivora ruficapilla</i> | W | u | - | f | - |
| Northern Parula* | <i>Parula americana</i> | W | f | u | f | - |

| Common Name | Scientific Name | Location | Sp | Su | F | W |
|------------------------------|--------------------------------|----------|----|----|---|---|
| Yellow Warbler* | <i>Dendroica petechia</i> | W, K | c | u | c | x |
| Chestnut-sided Warbler | <i>Dendroica pensylvanica</i> | W, K | f | - | f | - |
| Magnolia Warbler | <i>Dendroica magnolia</i> | W, K | f | - | c | - |
| Cape May Warbler | <i>Dendroica tigrina</i> | W | f | - | u | - |
| Black-throated Blue Warbler | <i>Dendroica caerulescens</i> | W | v | - | v | - |
| Yellow-rumped Warbler | <i>Dendroica coronata</i> | C | c | - | c | a |
| Black-throated Green Warbler | <i>Dendroica virens</i> | W, K | f | - | f | - |
| Blackburnian Warbler | <i>Dendroica fusca</i> | W | u | - | u | - |
| Yellow-throated Warbler* | <i>Dendroica dominica</i> | W | u | r | u | |
| Pine Warbler* | <i>Dendroica pinus</i> | W, K | c | c | c | c |
| Prairie Warbler* | <i>Dendroica discolor</i> | W, K | f | u | f | - |
| Palm Warbler | <i>Dendroica palmarum</i> | W, K | f | - | c | u |
| Bay-breasted Warbler | <i>Dendroica castanea</i> | W, K | f | - | c | - |
| Blackpoll Warbler | <i>Dendroica striata</i> | W | c | - | x | - |
| Cerulean Warbler | <i>Dendroica cerulea</i> | W | u | r | u | - |
| Black-and-white Warbler* | <i>Mniotilta varia</i> | C | f | u | c | - |
| American Redstart* | <i>Setophaga ruticilla</i> | W | c | u | c | - |
| Prothonotary Warbler* | <i>Protonotaria citrea</i> | W, S | c | c | c | - |
| Worm-eating Warbler* | <i>Helmitheros vermivorum</i> | W, S, F | f | u | f | - |
| Swainson's Warbler* | <i>Limnothlypis swainsonii</i> | W | u | r | u | - |
| Ovenbird* | <i>Seiurus aurocapilla</i> | C | f | u | c | - |
| Northern Waterthrush | <i>Seiurus noveboracensis</i> | W | f | - | u | x |
| Louisiana Waterthrush | <i>Seiurus motacilla</i> | W | u | u | u | - |
| Kentucky Warbler* | <i>Oporornis formosus</i> | W, K, S | f | f | f | - |
| Connecticut Warbler | <i>Oporornis agilis</i> | W | r | - | u | - |
| Mourning Warbler | <i>Oporornis philadelphia</i> | W, K | u | - | u | - |

| Common Name | Scientific Name | Location | Sp | Su | F | W |
|-------------------------------|----------------------------------|----------|----|----|---|---|
| Common Yellowthroat* | <i>Geothlypis trichas</i> | W, K | c | f | a | u |
| Hooded Warbler* | <i>Wilsonia citrina</i> | W, K, S | f | f | c | - |
| Wilson's Warbler | <i>Wilsonia pusilla</i> | W | u | - | u | - |
| Canada Warbler | <i>Wilsonia canadensis</i> | W | u | - | u | - |
| Yellow-breasted Chat* | <i>Icteria virens</i> | W, K, S | c | c | c | - |
| Summer Tanager* | <i>Piranga rubra</i> | C | c | c | c | - |
| Scarlet Tanager* | <i>Piranga olivacea</i> | C | c | u | f | - |
| Eastern Towhee* | <i>Pipilo erythrophthalmus</i> | W, K, S | c | c | c | c |
| Bachman's Sparrow* | <i>Aimophila aestivalis</i> | W | v | r | - | - |
| American Tree Sparrow | <i>Spizella arborea</i> | W | - | - | - | v |
| Chipping Sparrow* | <i>Spizella passerina</i> | W, K | c | u | c | u |
| Field Sparrow* | <i>Spizella pusilla</i> | W, K | c | c | c | a |
| Vesper Sparrow | <i>Pooecetes gramineus</i> | W, K | f | - | f | u |
| Lark Sparrow* | <i>Chondestes grammacus</i> | W, K | r | r | r | - |
| Savannah Sparrow | <i>Passerculus sandwichensis</i> | W, K | c | - | c | c |
| Grasshopper Sparrow* | <i>Ammodramus savannarum</i> | W, K | f | f | f | - |
| Henslow's Sparrow | <i>Ammodramus henslowii</i> | W | h | - | h | h |
| LeConte's Sparrow | <i>Ammodramus leconteii</i> | W, K | - | - | - | r |
| Nelson's Sharp-tailed Sparrow | <i>Ammodramus nelsoni</i> | W | v | - | - | - |
| Fox Sparrow | <i>Passerella iliaca</i> | W, K | f | - | f | c |
| Song Sparrow | <i>Melospiza melodia</i> | W, K | c | u | c | a |
| Lincoln's Sparrow | <i>Melospiza lincolnii</i> | W, K | u | - | u | r |
| Swamp Sparrow | <i>Melospiza georgiana</i> | W, K | c | - | c | a |
| White-throated Sparrow | <i>Zonotrichia albicollis</i> | C | a | - | a | a |
| Harris's Sparrow | <i>Zonotrichia querula</i> | V | - | - | - | x |
| White-crowned Sparrow | <i>Zonotrichia leucophrys</i> | W, K | u | - | f | f |

| Common Name | Scientific Name | Location | Sp | Su | F | W |
|-------------------------|--------------------------------------|----------|----|----|---|---|
| Dark-eyed Junco | <i>Junco hyemalis</i> | W, K | f | - | c | c |
| Lapland Longspur | <i>Calcarius lapponicus</i> | W, K | u | - | - | f |
| Northern Cardinal* | <i>Cardinalis cardinalis</i> | C | a | a | a | a |
| Rose-breasted Grosbeak | <i>Pheucticus ludovicianus</i> | W, K | c | - | c | - |
| Blue Grosbeak* | <i>Passerina caerulea</i> | W, K | c | c | c | - |
| Indigo Bunting* | <i>Passerina cyanea</i> | W, K, S | a | c | a | - |
| Dickcissel* | <i>Spiza americana</i> | W, K | c | c | c | x |
| Bobolink | <i>Dolichonyx oryzivorus</i> | W, K | c | - | f | - |
| Red-winged Blackbird* | <i>Agelaius phoeniceus</i> | W, K | c | c | a | a |
| Eastern Meadowlark* | <i>Sturnella magna</i> | W, K | c | c | c | c |
| Western Meadowlark | <i>Sturnella neglecta</i> | W | - | - | v | v |
| Yellow-headed Blackbird | <i>Xanthocephalus xanthocephalus</i> | W | v | - | v | v |
| Rusty Blackbird | <i>Euphagus carolinus</i> | W | u | - | u | u |
| Brewer's Blackbird | <i>Euphagus cyanocephalus</i> | W | u | - | u | u |
| Common Grackle* | <i>Quiscalus quiscula</i> | W, K | c | c | a | a |
| Brown-headed Cowbird* | <i>Molothrus ater</i> | W, K | c | c | a | a |
| Orchard Oriole* | <i>Icterus spurius</i> | W, K, S | c | c | u | - |
| Baltimore Oriole* | <i>Icterus galbula</i> | W, K | f | u | f | x |
| Purple Finch | <i>Carpodacus purpureus</i> | W, K | u | - | u | u |
| House Finch* (I) | <i>Carpodacus mexicanus</i> | W, K | c | c | c | c |
| Pine Siskin | <i>Carduelis pinus</i> | W | u | - | u | f |
| American Goldfinch* | <i>Carduelis tristis</i> | W, K | f | f | c | c |
| Evening Grosbeak | <i>Coccothraustes vespertinus</i> | W | r | - | r | r |
| House Sparrow (I) | <i>Passer domesticus</i> | W | c | c | c | c |

Source: Wheeler Complex data files, 2006

WHEELER NATIONAL WILDLIFE REFUGE COMPLEX MAMMAL LIST

| Common Name | Scientific Name |
|---------------------------|----------------------------------|
| Opossum | <i>Didelphis marsupialis</i> |
| Short-tailed shrew | <i>Blarina brevicauda</i> |
| Least shrew | <i>Cryptotis parva</i> |
| Eastern Mole | <i>Scalopus aquaticus</i> |
| Little brown myotis | <i>Myotis lucifugus</i> |
| Gray bat | <i>Myotis grisescens</i> |
| Indiana bat | <i>Myotis sodalis</i> |
| Southeastern myotis | <i>Myotis austroriparius</i> |
| Silver-haired bat | <i>Lasionycteris noctivagans</i> |
| Eastern pipistrelle | <i>Pipistrellus subflavus</i> |
| Big brown bat | <i>Eptesicus fuscus</i> |
| Red bat | <i>Lasiurus borealis</i> |
| Seminole bat | <i>Lasiurus seminolus</i> |
| Hoary bat | <i>Lasiurus cinereus</i> |
| Evening bat | <i>Nycticeius humeralis</i> |
| Eastern big-eared bat | <i>Plecotus rafinesquei</i> |
| Brazilian free-tailed bat | <i>Tadarida brasiliensis</i> |
| Nine-banded armadillo | <i>Dasypus novemcinctus</i> |
| Eastern cottontail | <i>Sylvilagus floridanus</i> |
| Swamp rabbit | <i>Sylvilagus aquaticus</i> |
| Eastern chipmunk | <i>Tamias sciurus</i> |
| Gray squirrel | <i>Sciurus carolinensis</i> |
| Fox squirrel | <i>Sciurus niger</i> |
| Southern flying squirrel | <i>Glaucomys volans</i> |
| Beaver | <i>Castor canadensis</i> |
| Rice rat | <i>Oryzomys palustris</i> |
| Eastern harvest mouse | <i>Reithrodontomys humulis</i> |

| Common Name | Scientific Name |
|-----------------------|---------------------------------|
| White-footed mouse | <i>Peromyscus leucopus</i> |
| Cotton mouse | <i>Peromyscus gossypinus</i> |
| Golden mouse | <i>Peromyscus nuttalli</i> |
| Hispid cotton rat | <i>Sigmodon hispidus</i> |
| Eastern wood rat | <i>Neotoma floridana</i> |
| Pine vole | <i>Microtus pinetorum</i> |
| Muskrat | <i>Ondatra zibethicus</i> |
| Black rat | <i>Rattus rattus</i> |
| Norway rat | <i>Rattus norvegicus</i> |
| House mouse | <i>Mus musculus</i> |
| Coyote | <i>Canis latrans</i> |
| Red fox | <i>Vulpes fulva</i> |
| Gray fox | <i>Urocyon cinereoargenteus</i> |
| Raccoon | <i>Procyon lotor</i> |
| Long-tailed weasel | <i>Mustela frenata</i> |
| Mink | <i>Mustela vison</i> |
| Eastern spotted skunk | <i>Spilogale putorius</i> |
| Striped skunk | <i>Mephitis mephitis</i> |
| Bobcat | <i>Lynx rufus</i> |
| White-tailed deer | <i>Odocoileus virginiana</i> |

Source: Wheeler Complex data files, 2005

WHEELER NATIONAL WILDLIFE REFUGE COMPLEX AMPHIBIAN AND REPTILE LIST

| Common Name | Scientific Name |
|-------------------------------|---|
| American alligator | <i>Alligator mississippiensis</i> |
| Common snapping turtle | <i>Chelydra serpentina</i> |
| Common map turtle | <i>Graptemys geographica</i> |
| False map turtle | <i>Graptemys pasudogeographica</i> |
| River cooter | <i>Pseudemys concinna</i> |
| Yellow-bellied pond slider | <i>Trachemys scripta</i> |
| Eastern box turtle | <i>Terrapene carolina</i> |
| Eastern mud turtle | <i>Kinosternon subrubrum</i> |
| Southern painted turtle | <i>Chrysemys picta dorsalis</i> |
| Eastern spiny softshell | <i>Trionyx spinifera spinifera</i> |
| Green anole | <i>Anolis carolinensis</i> |
| Ground skink | <i>Scincella laterale</i> |
| Five-lined skink | <i>Eumeces fasciatus</i> |
| Broad-headed skink | <i>Eumeces laticeps</i> |
| Southeastern five-lined skink | <i>Eumeces inexpectatus</i> |
| Fence lizard | <i>Sceloporus undulatus</i> |
| Slender glass lizard | <i>Ophisaurus attenuatus</i> |
| Six-lined racerunner | <i>Cnemidophorus sexlineatus</i> |
| Eastern worm snake | <i>Carphophis amoenus</i> |
| Northern ringneck snake | <i>Diadophis punctatus</i> |
| Yellow-bellied water snake | <i>Nerodia erythrogaster flavigaster</i> |
| Corn snake | <i>Elaphe guttata</i> |
| Eastern hognose snake | <i>Heterodon platyrhinos</i> |
| Queen snake | <i>Nerodia septemerittata</i> |
| Midland brown snake | <i>Storeria dekayi wrightorum</i> |
| Mole snake | <i>Lampropeltis calligaster occipitolineata</i> |
| Black kingsnake | <i>Lampropeltis getula nigra</i> |
| Scarlet kingsnake | <i>Lampropeltis triangulum elapsoides</i> |

| Common Name | Scientific Name |
|----------------------------|---|
| Northern red-bellied snake | <i>Storeria occipitomaculata occipitomaculata</i> |
| Eastern garter snake | <i>Thamnophis sirtalis sirtalis</i> |
| Eastern ribbon snake | <i>Thamnophis sauritus</i> |
| Eastern smooth earth snake | <i>Virginia valeriae valeriae</i> |
| Rough earth snake | <i>Virginia striatula</i> |
| Mississippi ringneck snake | <i>Diadophis punctatus stictogenys</i> |
| Western mud snake | <i>Farancia abacura reinwardtii</i> |
| Black racer | <i>Coluber constrictor</i> |
| Rough green snake | <i>Opheodrys aestivus</i> |
| Rat snake | <i>Elaphe obsoleta</i> spp. |
| Red milk snake | <i>Lampropeltis triangulum sypila</i> |
| Scarlet snake | <i>Cemophora coccinea</i> |
| Midland water snake | <i>Nerodia sipedon pleuralis</i> |
| Crowned snake | <i>Tantilla relicta</i> |
| Northern copperhead | <i>Agkistrodon contortrix mokasen</i> |
| Eastern cottonmouth | <i>Agkistrodon piscivorus piscivorus</i> |
| Pygmy rattlesnake | <i>Sistrurus miliarius</i> |
| Timber rattlesnake | <i>Crotalus horridus</i> |
| Marbled salamander | <i>Ambystoma opacum</i> |
| Small-mouthed salamander | <i>Ambystoma texanum</i> |
| Spotted salamander | <i>Ambystoma maculatum</i> |
| Eastern tiger salamander | <i>Ambystoma tigrinum tigrinum</i> |
| Hellbender | <i>Cryptobranchus alleganiensis</i> |
| Red-spotted newt | <i>Notophthalmus viridescens viridescens</i> |
| Mudpuppy | <i>Necturus maculosus maculosus</i> |
| Fowler's toad | <i>Bufo woodhousei fowleri</i> |
| Southern cricket frog | <i>Acris gryllus gryllus</i> |
| Northern cricket frog | <i>Acris crepitans crepitans</i> |
| Northern spring peeper | <i>Pseudacris crucifer crucifer</i> |

| Common Name | Scientific Name |
|---------------------------|---------------------------------------|
| Green treefrog | <i>Hyla cinerea</i> |
| Eastern gray treefrog | <i>Hyla versicolor</i> |
| Upland chorus frog | <i>Pseudacris triseriata feriarum</i> |
| E. narrow-mouthed toad | <i>Gastrophryne carolinensis</i> |
| Bull frog | <i>Rana catesbeiana</i> |
| Green frog | <i>Rana clamitans</i> |
| Dusky salamander | <i>Desmognathus fuscus</i> |
| Two-lined salamander | <i>Eurycea bislineata</i> |
| Long-tailed salamander | <i>Eurycea longicauda longicauda</i> |
| Cave salamander | <i>Eurycea lucifuga</i> |
| Tennessee cave salamander | <i>Gyrinophilus palleucus</i> |
| Zigzag salamander | <i>Plethodon dorsalis</i> |
| Slimy salamander | <i>Plethodon glutinosus</i> |
| Northern red salamander | <i>Pseudotriton ruber ruber</i> |

Source: Wheeler Complex data files, 2006

WHEELER NATIONAL WILDLIFE REFUGE FISH SPECIES LIST

| Common Name | Scientific Name |
|------------------------|-------------------------------------|
| Ohio Lamprey | <i>Ichthyomyzon bdellium</i> |
| Chestnut Lamprey | <i>Ichthyomyzon castaneus</i> |
| Least brook Lamprey | <i>Ichthyomyzon aepyptera</i> |
| Longnose Gar | <i>Lepisosteus osseus</i> |
| Spotted Gar | <i>Lepisosteus oculaatus</i> |
| Alligator Gar | <i>Lepisosteus spatula</i> |
| Shortnose Gar | <i>Lepisosteus platostomus</i> |
| Paddlefish | <i>Polyodon spatula</i> |
| Lake Sturgeon | <i>Acipenser fulvescens</i> |
| Shovelnose Sturgeon | <i>Scaphirhynchus platorhynchus</i> |
| Bowfin | <i>Amia calva</i> |
| Channel Catfish | <i>Ictalurus furcatus</i> |
| Yellow Bullhead | <i>Ameiurus natalis</i> |
| Flathead Catfish | <i>Pylodictus olivaris</i> |
| Black Bullhead Catfish | <i>Ameiurus melas</i> |
| Brown Bullhead Catfish | <i>Ameiurus nebulosus</i> |
| Blue Catfish | <i>Ictalurus furcatus</i> |
| Slender madtom | <i>Noturus exilis</i> |
| Bluegill | <i>Lepomis macrochirus</i> |
| Redear Sunfish | <i>Lepomis microlophus</i> |
| Green Sunfish | <i>Lepomis cyanellus</i> |
| Orange-spotted sunfish | <i>Lepomis humilis</i> |
| Black Crappie | <i>Pomoxis nigromaculatus</i> |
| Warmouth | <i>Lepomis gulosus</i> |
| Longear Sunfish | <i>Lepomis megalotis</i> |
| White Crappie | <i>Pomoxis annularis</i> |
| Mobile Logperch | <i>Percina Kathae</i> |
| Largemouth Bass | <i>Micropterus salmoides</i> |

| Common Name | Scientific Name |
|----------------------|--------------------------------|
| Smallmouth Bass | <i>Micropterus dolomieu</i> |
| Spotted Bass | <i>Micropterus punctulatus</i> |
| Rock Bass | <i>Ambloplites rupestris</i> |
| Yellow Bass | <i>Morone mississippiensis</i> |
| Striped Bass | <i>Morone saxatilis</i> |
| White Bass | <i>Morone chrysops</i> |
| Common Carp (intro.) | <i>Cyprinus carpio</i> |
| Threadfin Shad | <i>Dorosoma petenense</i> |
| Gizzard Shad | <i>Donosoma cepedianum</i> |
| Smallmouth Buffalo | <i>Ictiobus bubalus</i> |
| Bigmouth Buffalo | <i>Itiobus cyprinellus</i> |
| Black Buffalo | <i>Ictiobus niger</i> |
| Freshwater Drum | <i>Aplodinotus grunniens</i> |
| Grass Pickerel | <i>Esox americanus</i> |
| Pirate Perch | <i>Aphredoderus sayanus</i> |
| Sauger | <i>Sander canadensis</i> |
| Yellow Perch | <i>Perca flavescens</i> |
| Skipjack herring | <i>Alosa chrysochloris</i> |
| Spotted Sucker | <i>Minutrema melanops</i> |
| Blacktail Redhorse | <i>Moxostoma poecilurum</i> |

Source: Wheeler Complex data files, 2006

WHEELER NATIONAL WILDLIFE REFUGE AND ADJACENT WATERS FRESHWATER MUSSEL LIST

| Common Name | Scientific Name |
|---------------------|--|
| Spectaclecase | <i>Cumberlandia monodonta</i> (Say, 1829) |
| Threeridge | <i>Amblema plicata</i> (Say, 1817) |
| Flat Floater | <i>Anodonta suborbiculata</i> (Say, 1831) |
| Rock Pocketbook | <i>Arcidents confragosus</i> (Say, 1829) |
| Purple Wartyback | <i>Cyclonaias tuberculata</i> (Rafinesque, 1820) |
| Butterfly | <i>Ellipsaria lineolata</i> (Rafinesque, 1820) |
| Elephant Ear | <i>Elliptio crassidens</i> (Lamarck, 1819) |
| Spike | <i>Elliptio dilatata</i> (Rafinesque, 1820) |
| Tennessee Pigtoe | <i>Fusconaia barnesiana</i> (Lea, 1838) |
| Ebonyshell | <i>Fusconaia ebena</i> (Lea, 1831) |
| Long-solid | <i>Fusconaia subrotunda</i> (Lea, 1831) |
| Pink Mucket | <i>Lampsilis abrupta</i> (Say, 1831) |
| Pocketbook | <i>Lampsilis ovata</i> (Say, 1817) |
| Yellow Sandshell | <i>Lampsilis teres</i> (Rafinesque, 1820) |
| White Heelsplitter | <i>Lasmigona complanata</i> (Barnes, 1823) |
| Fragile Papershell | <i>Leptodea fragilis</i> (Rafinesque, 1820) |
| Black Sandshell | <i>Ligumia recta</i> (Lamarck, 1819) |
| Washboard | <i>Megalonaias nervosa</i> (Rafinesque, 1820) |
| Threehorn Wartyback | <i>Obliquaria reflexa</i> Rafinesque, 1820 |
| Sheepnose | <i>Plethobasus cyphus</i> (Rafinesque, 1820) |
| Ohio Pigtoe | <i>Pleurobema cordatum</i> (Rafinesque, 1820) |
| Rough Pigtoe | <i>Pleurobema plenum</i> (Lea, 1840) |
| Pyramid Pigtoe | <i>Pleurobema rubrum</i> (Rafinesque, 1820) |
| Round Pigtoe | <i>Pleurobema sintoxia</i> (Rafinesque, 1820) |
| Pink Heelsplitter | <i>Potamilus alatus</i> (Say, 1817) |
| Pink Papershell | <i>Potamilus ohioensis</i> (Rafinesque, 1820) |
| Kidneyshell | <i>Ptychobranthus fasciolaris</i> (Rafinesque, 1820) |

| Common Name | Scientific Name |
|---------------------|--|
| Giant Floater | <i>Pyganodon grandis</i> (Say, 1829) |
| Monkeyface | <i>Quadrula metanevra</i> (Rafinesque, 1820) |
| Pimpleback | <i>Quadrula pustulosa</i> (Lea, 1831) |
| Mapleleaf | <i>Quadrula quadrula</i> (Rafinesque, 1820) |
| Purple Lilliput | <i>Toxolasma lividus</i> (Rafinesque, 1831) |
| Lilliput | <i>Toxolasma parvus</i> (Barnes, 1823) |
| Pistolgrip | <i>Tritogonia verrucosa</i> (Rafinesque, 1820) |
| Fawnsfoot | <i>Truncilla donaciformis</i> (Lea, 1828) |
| Paper Pondshell | <i>Utterbackia imbecillis</i> (Say, 1829) |
| Rainbow | <i>Villosa iris</i> (Lea, 1829) |
| Mountain Creekshell | <i>Villosa vanuxemensis</i> (Lea, 1838) |

Source: Jeff Garner, Alabama Department of Conservation and Natural Resources, 2006

WHEELER NATIONAL WILDLIFE REFUGE AND ADJACENT WATERS FRESHWATER SNAIL LIST

| Common Name | Scientific Name |
|----------------------|---------------------------------|
| Dusky Ancyloid | <i>Laevapex fuscus</i> |
| Ghost Marstonia | <i>Pyrgulopsis</i> |
| Armored Marstonia | <i>Pyrgulopsis pachyta</i> |
| Aminicola sp. | Aminicola sp. |
| Lyogyrus sp. | Lyogyrus sp |
| Golden Fossaria | <i>Fossaria obrussa</i> |
| Mimic Lymnaea | <i>Pseudosuccinea columella</i> |
| Tadpole Physa | <i>Physella gyrina</i> |
| Ash Gyro | <i>Gyraulus parvus</i> |
| Two-ridge Rams-horn | <i>Helisoma anceps</i> |
| Disc Sprite | <i>Micromenetus Dilatatus</i> |
| Anthony's Riversnail | <i>Athearnia anthonyi</i> |
| Acute Elimia | <i>Elimia acuta</i> |
| Engraved Elimia | <i>Elimia perstriata</i> |
| Onyx Rocksnail | <i>Leptoxis praerosa</i> |
| Varicosa Rocksnail | <i>Lithasia verrucosa</i> |
| Silty Hornsnail | <i>Pleurocera canaliculatum</i> |
| Skirted Hornsnail | <i>Pleurocera pyrenellum</i> |
| Slender Campeloma | <i>Campeloma decampi</i> |
| Pointed Campeloma | <i>Campeloma decisum</i> |
| Furrowed Lioplax | <i>Lioplax sulculosa</i> |
| Banded Mysterysnail | <i>Viviparus georgianus</i> |
| Olive Mysterysnail | <i>Viviparus subpurpureus</i> |
| Musculim spp. | <i>Musculim spp.</i> |
| Pisidium spp. | <i>Pisidium spp.</i> |
| Sphaerium spp. | <i>Sphaerium spp.</i> |

Source: Wheeler Complex data files, 2006

WHEELER NATIONAL WILDLIFE REFUGE COMPLEX WOODY PLANT SPECIES LIST

| Common Name | Scientific Name |
|--|--|
| Loblolly Pine | <i>Pinus taeda</i> |
| Pitch Pine | <i>Pinus rigida</i> |
| Short Leaf Pine | <i>Pinus echinata</i> |
| Virginia Scrub or Jersey Pine | <i>Pinus virginiana</i> |
| Baldcypress | <i>Taxodium distichum</i> |
| Arizona Cypress | <i>Cypressus arizonica</i> |
| Eastern Red Cedar | <i>Juniperus virginiana</i> |
| Sawbrier | <i>Smilax glauca</i> |
| Bullbrier | <i>Smilax bona-nox</i> |
| Bristley | <i>Smilax hispida</i> |
| Greenbriar | <i>Smilax rotundifolia</i> |
| Greenbriar | <i>Smilax walteria</i> |
| Greenbriar | <i>Smilax herbacea</i> |
| Southern Cottonwood | <i>Populus deltoids</i> |
| Black Willow | <i>Salix nigra</i> |
| Black Walnut | <i>Juglans nigra</i> |
| Pecan | <i>Carya illnoensis</i> |
| Water Hickory | <i>Carya aquatica</i> |
| Shagbark or Scaleybark Hickory | <i>Carya ovata</i> |
| Shagbark Hickory or Scaleybark Hickory | <i>Carya carolinae septentrionalis</i> |
| Shagbark Hickory | <i>Carya laciniosa</i> |
| White Hickory or Tightbark Hickory | <i>Carya alba</i> |
| White Hickory | <i>Carya pallida</i> |
| Pignut Hickory | <i>Carya glabra</i> |
| Pignut hickory | <i>Carya ovalis</i> |
| Blue Beech | <i>Carpinus caroliniana</i> |
| Ironwood | <i>Ostrya virginiana</i> |
| Red or River Birch | <i>Betula nigra</i> |
| Smooth Alder | <i>Alnus rugosa</i> |
| Hazelnut | <i>Corylus americana</i> |
| American Beech | <i>Fagus grandifolia</i> |

| Common Name | Scientific Name |
|---------------------------------------|--|
| American Chestnut | <i>Castanea dentate</i> |
| Asiatic Chestnut | <i>Castanea mollissima</i> |
| Chinquapin | <i>Castanea pumila</i> |
| Northern Red Oak | <i>Quercus rubra</i> |
| Shumard's Oak | <i>Quercus shumardii</i> |
| Black Oak | <i>Quercus velutina</i> |
| Scarlet Oak | <i>Quercus coccinea</i> |
| Southern Red Oak | <i>Quercus falcata</i> |
| Cherrybark oak | <i>Quercus falcata var. pagodaefolia</i> |
| Blackjack Oak or Shrub Oak | <i>Quercus marilandica</i> |
| Water Oak | <i>Quercus nigra</i> |
| Willow Oak | <i>Quercus phellos</i> |
| Nuttall's Oak | <i>Quercus nuttallii</i> |
| Overcup Oak | <i>Quercus Lyrata</i> |
| Post Oak | <i>Quercus stellata</i> |
| White Oak | <i>Quercus alba</i> |
| Swamp chestnut Oak | <i>Quercus michauxii</i> |
| Chinquapin Oak or Yellow Chestnut Oak | <i>Quercus muhlenbergii</i> |
| Rock Chestnut Oak | <i>Quercus prinus</i> |
| White or American elm | <i>Ulmus americana</i> |
| Winged elm | <i>Ulmus alata</i> |
| Red or Slippery Elm | <i>Ulmus rubra</i> |
| Hackberry or Sugarberry | <i>Celtis laevigator</i> |
| Hackberry or Sugarberry | <i>Celtis occidentalis</i> |
| Red Mulberry | <i>Morus rubra</i> |
| White Mulberry | <i>Morus alba</i> |
| Paper Mulberry | <i>Broussonetia papyrifera</i> |
| Osage orange | <i>Maclura pomifera</i> |
| Buck-Vine | <i>Brunnichia cirrhosa</i> |
| Tulip or Yellow poplar | <i>Liriodendron tulipifera</i> |
| Common mock Orange | <i>Philadelphus inodorus</i> |
| Climbing Hydrangea | <i>Decumaria barbara</i> |

| Common Name | Scientific Name |
|----------------------------|--------------------------------|
| Wild Hydrangea | <i>Hydrangea quercifolia</i> |
| Virginia Willow | <i>Itea virginica</i> |
| Pawpaw | <i>Asimina triloba</i> |
| Sassafras | <i>Sassafras albidum</i> |
| Spicebush | <i>Benzoin aestivale</i> |
| Red or Sweet Gum | <i>Liquidambar styraciflua</i> |
| Witch Hazel | <i>Hammamelis virginiana</i> |
| Sycamore | <i>Plantus occidentalis</i> |
| Multiflora Rose | <i>Rosa multiflora</i> |
| Swamp Rose | <i>Rosa palustris</i> |
| Cherokee Rose | <i>Rosa laevigata</i> |
| Sweet Shrubs | <i>Calycanthus mohrii</i> |
| Pear | <i>Pyrus communis</i> |
| Apple | <i>Malus malus</i> |
| Crab Apple | <i>Malus angustifolia</i> |
| Haw | <i>Crateagus spp.</i> |
| Wild plum | <i>Prunus americana</i> |
| Chickasaw Plum | <i>Prunus angustifolia</i> |
| Black cherry | <i>Prunus serotina</i> |
| Peach | <i>Amygdalus persica</i> |
| Mimosa | <i>Albizia julibrissin</i> |
| Redbud | <i>Cercis canadensis</i> |
| Honey locust | <i>Gleditsia triacanthos</i> |
| Lead Plant or Plume Locust | <i>Amorpha fruticosa</i> |
| Black locust | <i>Robinia pseudo-acacia</i> |
| Bicolor lespedeza | <i>Lespedeza bicolor</i> |
| Kudzu Vine | <i>Pueraria lobata</i> |
| Tree-of-Heaven | <i>Ailanthus altissima</i> |
| Chinaberry | <i>Melia azedarach</i> |
| Poison Ivy | <i>Toxicodendron radicans</i> |
| Dwarf Sumac | <i>Rhus copallina</i> |
| Smooth Sumac | <i>Rhus glabra</i> |

| Common Name | Scientific Name |
|--|------------------------------------|
| Staghorn Sumac | <i>Rhus typhina</i> |
| Fragrant Sumac | <i>Schmaltzia crenata</i> |
| American Holly | <i>Ilex opaca</i> |
| Winterberry | <i>Ilex laevigata</i> |
| Deciduous Holly | <i>Ilex decidua</i> |
| Strawberry Bush | <i>Euonymus americanus</i> |
| Dwarf Buckeye | <i>Aesculus pavia</i> |
| American Bladdernut | <i>Staphylea trifolia</i> |
| Silver Maple | <i>Acer saccharinum</i> |
| Sugar Maple | <i>Acer saccharum</i> |
| Red Maple | <i>Acer rubrum</i> |
| Box Elder | <i>Acer negundo</i> |
| Rattan vine | <i>Berchemia scandens</i> |
| New Jersey Tea | <i>Ceanothus americanus</i> |
| Buckthorn | <i>Rhamnus caroliniana</i> |
| Muscadine | <i>Vitis rotundifolia</i> |
| Fox Grape | <i>Vitis labrusca</i> |
| Fox Grape | <i>Vitis vulpine</i> |
| Fox Grape | <i>Vitis baileyana</i> |
| Bunch Grapes | <i>Vitis spp.</i> |
| False Grapes | <i>Ampelopsis spp.</i> |
| Pepper-vine | <i>Amplelopis arborea</i> |
| Virginia creeper | <i>Parthenocissus quinquefolia</i> |
| Basswood | <i>Tilia caroliniana</i> |
| St. Andrew's Cross | <i>Ascyrum hypericoides</i> |
| St. John's Worts or Bog Myrtles | <i>Hypericum spp.</i> |
| Thunderwood, Hercules' Club or Devil's Walking Stick | <i>Aralia spinosa</i> |
| Ginseng | <i>Panax quinquefolium</i> |
| Swamp Loosestrife or Water Willow | <i>Decedon verticillatus</i> |
| Black gum | <i>Nyssa sylvatica</i> |
| Pond-gum | <i>Nyssa biflora</i> |
| Swamp Tupelo | <i>Nyssa aquatica</i> |

| Common Name | Scientific Name |
|---------------------------------|----------------------------------|
| Flowering Dogwood | <i>Cornus florida</i> |
| Roughleaf Dogwood | <i>Cornus asperifolia</i> |
| Wild Azalea | <i>Azalea nudiflora</i> |
| Mountain Laurel | <i>Kalmia latifolia</i> |
| Sourwood | <i>Oxydendrum arboreum</i> |
| Sparkleberry | <i>Batodendron arboretum</i> |
| Huckleberry | <i>Vaccinium elliotii</i> |
| Huckleberry | <i>Vaccinium vacillans</i> |
| Buckthorn | <i>Bumelia lycioides</i> |
| Persimmon | <i>Diospyros virginiana</i> |
| Silverbell | <i>Halesia carolina</i> |
| Styrax | <i>Styrax grandifolia</i> |
| Green ash | <i>Fraxinun pennyslvanica</i> |
| White Ash | <i>Fraxinun americana</i> |
| Swamp privet | <i>Forestiera acuminata</i> |
| Graybeard or Fringe Tree | <i>Chionanthus virginica</i> |
| Common Privet | <i>Ligustrum vulgare</i> |
| French Mulberry or Beauty Berry | <i>Callicarpa americana</i> |
| Empress tree | <i>Paulownia tomentosa</i> |
| Cross Vine | <i>Bignonia capreolata</i> |
| Trumpet creeper | <i>Bignonia radicans</i> |
| Catalpa | <i>Catalpa bignonioides</i> |
| Mistletoe | <i>Phoradendron flavescens</i> |
| Buttonbush | <i>Cephalanthus occidentalis</i> |
| Elder | <i>Sambucus canadensis</i> |
| Black Haw | <i>Viburnum rufidulum</i> |
| Japanese honeysuckle | <i>Lonicera japonica</i> |

Source: Wheeler Complex data files, 2006

Appendix J. Budget Requests

REFUGE OPERATING NEEDS SYSTEM (RONS)

| Station | RONS Project # | Station Rank | Project Title | One-time Cost | Annual Cost |
|---------|----------------|--------------|---|---------------|-------------|
| Wheeler | 96002 | 1 | Construct two (2) pump stations in the White Springs Dewatering Unit to provide an effective water supply | \$835,000 | \$60,000 |
| Wheeler | 96003 | 2 | Install three water control structures in the White Springs Dewatering Unit to enable effective water movement | \$319,000 | \$25,000 |
| Wheeler | 00008 | 3 | Improve maintenance programs by establishing a work leader position to supervise the Complex maintenance program | \$137,000 | \$72,000 |
| Wheeler | 03012 | 4 | Increase resource and visitor protection by establishing an additional law enforcement officer position | \$140,000 | \$75,000 |
| Wheeler | 96001 | 5 | Dewatering unit vegetation control | \$75,000 | \$30,000 |
| Wheeler | 02004 | 6 | Improve safety, environmental compliance, and asset management by establishing an assistant manager position to serve as facilities manager | \$140,000 | \$75,000 |
| Wheeler | 97007 | 7 | Beaver management | \$25,000 | \$10,000 |
| Wheeler | 00027 | 8 | Convert cooperative farming to contract farming | \$405,000 | \$300,000 |
| Wheeler | 97004 | 9 | Purchase a Geographic Information System | \$50,000 | \$10,000 |
| Wheeler | 02002 | 10 | Construct two pump stations in the Rockhouse Dewatering Unit | \$800,000 | \$40,000 |
| Wheeler | 00015 | 11 | Construct a simulated cave exhibit to interpret protected sensitive areas | \$80,000 | \$10,000 |
| Wheeler | 00025 | 12 | Develop a Wildlife Observation Building live camera | \$69,000 | \$12,000 |

| Station | RONS Project # | Station Rank | Project Title | One-time Cost | Annual Cost |
|----------|----------------|--------------|--|---------------|-------------|
| Wheeler | 02001 | 13 | Classification of natural plant communities and inventory of vascular flora | \$40,000 | \$4,000 |
| Wheeler | 97002 | 14 | Manage American Woodcock by establishing an additional biological technician position | \$118,000 | \$53,000 |
| Wheeler | 00020 | 15 | Purchase a volunteer rover vehicle | \$30,000 | \$5,000 |
| Wheeler | 00017 | 16 | Develop a Visitor Center computer interactive educational exhibit | \$30,000 | \$5,000 |
| Wheeler | 97008 | 17 | White Springs #4 Water Control Structures | \$100,000 | \$15,000 |
| Wheeler | 00012 | 18 | Expand visitor programs by establishing an additional park ranger position | \$118,000 | \$53,000 |
| Wheeler | 00006 | 19 | Conduct needed monitoring of wildlife populations on Wheeler Complex by establishing an additional wildlife biologist position | \$140,000 | \$75,000 |
| Wheeler | 00001 | 20 | Administration of Geographic Information System through establishment of a GIS Coordinator position | \$154,000 | \$89,000 |
| Wheeler | 00024 | 21 | Coordinator for proposed environmental education center | \$140,000 | \$89,000 |
| Wheeler | 00023 | 22 | Education resource specialist for proposed environmental education center | \$140,000 | \$75,000 |
| Wheeler | 00004 | 23 | Park ranger for proposed environmental education center | \$128,000 | \$63,000 |
| Wheeler | 00003 | 24 | Maintenance worker for proposed environmental education center | \$113,000 | \$49,000 |
| Wheeler | 99004 | 25 | Conduct needed water quality monitoring by establishing an biological technician position | \$213,000 | \$98,000 |
| Key Cave | 97010 | 1 | Manage endangered wildlife and habitats by establishing a new assistant manager position | \$154,000 | \$75,000 |
| Key Cave | 97009 | 2 | Restore and maintain habitats by establishing a new tractor operator position | \$122,000 | \$57,000 |

| Station | RONS Project # | Station Rank | Project Title | One-time Cost | Annual Cost |
|------------|----------------|--------------|--|---------------|-------------|
| Key Cave | 97011 | 3 | Analyze water quality impacting highly endangered Alabama cavefish | \$22,000 | \$12,000 |
| Key Cave | 00029 | 4 | Purchase a new truck-tractor | \$125,000 | \$5,000 |
| Key Cave | 00028 | 5 | Purchase a new lowboy trailer | \$90,000 | \$3,500 |
| Key Cave | 00026 | 6 | Purchase a new medium tractor and rotary mower | \$120,000 | \$5,000 |
| Key Cave | 00030 | 7 | Purchase a new cover disk | \$20,000 | \$1,000 |
| Key Cave | 00025 | 8 | Purchase a new small tractor and rotary mower | \$25,000 | \$2,500 |
| Key Cave | 00027 | 9 | Purchase a new native grass drill and spray rig | \$20,000 | \$3,000 |
| Key Cave | 97012 | 10 | Re-establish native grasses and forested uplands | \$35,000 | \$15,000 |
| Sauta Cave | 00001 | 1 | Manage endangered bats and other rare wildlife by establishing a new biologist position | \$140,000 | \$75,000 |
| Sauta Cave | 00002 | 2 | Monitor endangered bats and other rare wildlife by establishing a new biological technician position | \$128,000 | \$63,000 |
| Fern Cave | 00001 | 1 | Manage endangered bats and other rare wildlife by establishing a new biologist position | \$140,000 | \$75,000 |
| Fern Cave | 00002 | 2 | Monitor endangered bats and other rare wildlife by establishing a new biological technician position | \$128,000 | \$63,000 |

SERVICE ASSEST MAINTENANCE AND MANAGEMENT SYSTEM (SAMMS) NEEDS

| Station | SAMMS Project # | Complex Rank | Project Title | Estimated Cost |
|-----------------------------|-----------------|--------------|--|----------------|
| DEFERRED MAINTENANCE | | | | |
| Wheeler | 00103414 | 1 | Rehabilitate Inefficient White Springs Water Distribution System | \$176,000 |
| Wheeler | 80103371 | 2 | Replace Secondary and Sub-entrance Signs | \$27,000 |
| Wheeler | 98103379 | 3 | Replace HE Wash Rack | \$26,000 |
| Wheeler | 90103372 | 4 | Rehabilitate Refuge Boundary | \$82,000 |
| Wheeler | 00103393 | 5 | Repair of Gravel Road System in Limestone County | \$67,000 |
| Wheeler | 99103381 | 6 | Repair Garth Slough Road Damaged by Use and Erosion | \$27,000 |
| Wheeler | 01113573 | 7 | Replace Defective Crabtree Slough Water Control Structure | \$72,000 |
| Wheeler | 01113576 | 8 | Replace Blackwell Swamp Main Water Control Structure | \$125,000 |
| Wheeler | 02120303 | 9 | Replace Residence #2 | \$235,000 |
| HEAVY EQUIPMENT | | | | |
| Wheeler | 00103423 | 1 | Replace Caterpillar D-7E Crawler-Tractor | \$153,000 |
| Wheeler | 97103375 | 2 | Replace 1965 John Deere 3020 Tractor | \$55,000 |
| Wheeler | 00103417 | 3 | Replace International TD-15C Crawler-Tractor | \$153,000 |
| Wheeler | 00103424 | 4 | Replace Ford Backhoe | \$50,000 |
| Wheeler | 80103374 | 5 | Replace Worn 1978 GMC Dump Truck | \$55,000 |
| Wheeler | 00103416 | 6 | Replace John Deere 670 Road Grader | \$71,000 |
| Wheeler | 00103425 | 7 | Replace John Deere 690D Excavator | \$110,000 |
| Wheeler | 90103378 | 8 | Replace John Deere 350 Dozer and Fire Plow | \$136,000 |
| Wheeler | 00103421 | 9 | Replace John Deere 4055 Tractor | \$61,000 |
| Wheeler | 00103420 | 10 | Replace John Deere 4450 Tractor | \$70,000 |
| Wheeler | 04134795 | 11 | Replace Case 1150 Dozer | \$175,000 |
| Wheeler | 01113595 | 12 | Replace 1999 John Deere 6310 Tractor | \$48,000 |

| Station | SAMMS Project # | Complex Rank | Project Title | Estimated Cost |
|------------------------|-----------------|--------------|---|----------------|
| Wheeler | 02120349 | 13 | Replace New Holland Woods Boss Tractor | \$48,000 |
| Wheeler | 04134764 | 14 | Replace 2001 John Deere 6410 Tractor | \$52,000 |
| Wheeler | 04134193 | 15 | Replace 2002 Sterling Stake Dump Truck | \$50,000 |
| SMALL EQUIPMENT | | | | |
| Wheeler | 00103427 | 1 | Replace Boston Whaler | \$17,000 |
| Wheeler | 01114493 | 2 | Replace 1996 Dodge 4X4 Service Truck | \$27,000 |
| Wheeler | 01114513 | 3 | Replace 1996 Dodge Ram 4X4 Power Wagon | \$23,000 |
| Wheeler | 01114510 | 4 | Replace 1998 Chevrolet Vanwagon | \$21,000 |
| Wheeler | 01114459 | 5 | Replace Ditchrider Trailer Pump | \$13,000 |
| Wheeler | 01114413 | NR | Replace Terrain King Hydro 15 Mower | \$13,000 |
| Wheeler | 00103422 | NR | Replace Rome 2115 Disk Harrow | \$27,000 |
| Wheeler | 00103418 | NR | Replace Fire Pumper Trailer | \$17,000 |
| Wheeler | 01113594 | NR | Replace 1997 Bush Hog Flex-wing Rotary Cutter | \$10,000 |
| Wheeler | 01115228 | NR | Replace 1997 Exmark Turf Mower | \$6,000 |
| Wheeler | 04134812 | NR | Replace 1984 Gator Pump | \$8,000 |
| Wheeler | 00103426 | NR | Replace John Deere 2155 Tractor | \$22,000 |
| Wheeler | 01114505 | NR | Replace 1998 Ford F-150 4X2 Pickup | \$18,000 |
| Wheeler | 01114520 | NR | Replace 1999 Ford Ranger 4X2 Pickup | \$18,000 |
| Wheeler | 01114498 | NR | Replace 1999 Ford 4X2 F-150 Pickup | \$18,000 |
| Wheeler | 01114495 | NR | Replace 1999 Ford Ranger 4X4 Pickup | \$21,000 |
| Wheeler | 01114517 | NR | Replace 1999 Ford 4X4 Pickup | \$24,000 |
| Wheeler | 01114497 | NR | Replace 2000 Chevrolet S-10 4X2 Pickup | \$17,000 |
| Wheeler | 01114521 | NR | Replace 2001 Chevrolet 4X2 Pickup | \$19,000 |
| Wheeler | 01114524 | NR | Replace 2001 Chevrolet 4X4 Pickup | \$27,000 |
| Wheeler | 01114526 | NR | Replace 2001 Ford 4X4 Expedition | \$31,000 |
| Wheeler | 01113590 | NR | Replace 1999 Tiger Rotary Boom Mower | \$23,000 |
| Wheeler | 01114456 | NR | Replace Brown Tree Cutter Mower | \$7,000 |

| Station | SAMMS Project # | Complex Rank | Project Title | Estimated Cost |
|-------------------------------|-----------------|--------------|--|----------------|
| Wheeler | 01115226 | NR | Replace Dinsmore Slough Pump Unit | \$48,000 |
| Wheeler | 03125393 | NR | Replace Alamo Rotary Mower | \$23,000 |
| Wheeler | 04134814 | NR | Replace 2002 Gooseneck Trailer | \$7,000 |
| Wheeler | 04134773 | NR | Replace 2001 Tiger Side Mower | \$25,000 |
| Wheeler | 04134803 | NR | Replace 2003 Exmark Lawn Mower | \$8,000 |
| Wheeler | 04134811 | NR | Replace Auditorium Projector | \$25,000 |
| Wheeler | 04134194 | NR | Replace 2004 Ford Expedition | \$28,000 |
| Wheeler | 03125391 | NR | Replace 2003 Ford F-150 | \$23,000 |
| Wheeler | 03125390 | NR | Replace 2003 Chevy Trailblazer | \$26,000 |
| Wheeler | 04134191 | NR | Replace 6X6 Amphibious ATV | \$19,000 |
| REFUGE ROADS – TEA 211 | | | | |
| Wheeler | 05137795 | 1 | Repair Truck Trail Road (15.0 mi.) | \$1,673,600 |
| Wheeler | 03133139 | 2 | Transportation Planning for CCPs | \$261,000 |
| Wheeler | 04134826 | 3 | Repair Rockhouse Road (4.57 mi.) | \$5,189,000 |
| Wheeler | 04135737 | 4 | Repair Buckeye Pond Boundary Road (6.29 mi.) | \$4,139,000 |
| Wheeler | 04135735 | 5 | Repair Jolly Bottoms Road (1.52 mi.) | \$1,726,000 |
| Wheeler | 04134845 | 6 | Repair Bean Place Road (3.35 mi.) | \$3,804,000 |
| Wheeler | 04135759 | 7 | Repair Mooresville Access Road (1.25 mi.) | \$1,419,000 |
| Wheeler | 04135742 | 8 | Repair Dancy Bottom Road (0.1 mi.) | \$102,000 |
| Wheeler | 04135746 | 9 | Repair Cain Landing Road (0.37 mi.) | \$59,000 |
| Wheeler | 04135747 | 10 | Repair Suzie Hole Road (0.23 mi.) | \$261,000 |
| Wheeler | 04135786 | 11 | Repair Dancy Bottom Parking Area | \$33,000 |
| Key Cave | 04135731 | 12 | Repair South Parking Area (Rte 902) | \$15,000 |
| Key Cave | 04135732 | 13 | Repair East Parking Area (Rte 901) | \$22,000 |
| Key Cave | 04135734 | 14 | Repair West Parking Area (Rte 900) | \$28,000 |

| Station | SAMMS Project # | Complex Rank | Project Title | Estimated Cost |
|---------|-----------------|--------------|---|----------------|
| Wheeler | 04135738 | 15 | Repair Skinner Springs Road (1.9 mi.) | \$2,158,000 |
| Wheeler | 04134836 | 16 | Repair Blackwell Run Road (5.99 mi.) | \$5,666,000 |
| Wheeler | 04134847 | 17 | Repair Penny Bottom Road (2.86 mi.) | \$2,116,000 |
| Wheeler | 04134842 | 18 | Repair Talucah Landing Road and Ramp Parking (0.24 mi.) | \$136,000 |
| Wheeler | 04135744 | 19 | Repair Hickory Hills Boat Ramp Access Road (0.15 mi.) | \$85,000 |
| Wheeler | 04135745 | NR | Repair Bluff City Boat Ramp Access Road (0.07 mi.) | \$96,000 |
| Wheeler | 04135750 | NR | Repair Beaverdam Spur Road (0.19 mi.) | \$216,000 |
| Wheeler | 04135809 | NR | Repair Arrowhead Landing Boat Ramp Parking Area | \$93,000 |
| Wheeler | 04135804 | NR | Repair Jolly Bottom Handicapped Hunting Parking Area | \$107,000 |
| Wheeler | 04135739 | NR | Repair Beaverdam Peninsula Loop Road (3.14 mi.) | \$2,979,000 |
| Wheeler | 04135749 | NR | Repair Beaverdam Loop Cutoff Road (0.16 mi.) | \$182,000 |
| Wheeler | 04135751 | NR | Repair Beaverdam Peninsula Connector Road (0.51 mi.) | \$579,000 |
| Wheeler | 04135752 | NR | Repair Pryor Road Access Road (0.13 mi.) | \$74,000 |
| Wheeler | 04135754 | NR | Repair Beaverdam Peninsula Tower Access Road (0.59 mi.) | \$286,000 |
| Wheeler | 04135758 | NR | Repair Mooresville Peninsula Road (1.99 mi.) | \$2,260,000 |
| Wheeler | 04135761 | NR | Repair Mooresville Spur Road (0.45 mi.) | \$511,000 |
| Wheeler | 04135763 | NR | Repair Refuge HQ Road (0.09 mi.) | \$35,000 |
| Wheeler | 04135766 | NR | Repair Boat Ramp Access Road (Rte 109, 0.17 mi) | \$97,000 |
| Wheeler | 04135768 | NR | Repair Refuge Office Parking Area (Rte 900) | \$5,000 |
| Wheeler | 04135770 | NR | Repair Handicapped Fishing Parking Area | \$12,000 |
| Wheeler | 04135778 | NR | Repair Visitor Center Parking Area | \$188,000 |
| Wheeler | 04135781 | NR | Repair Visitor Center Bus Parking Area | \$26,000 |

| Station | SAMMS Project # | Complex Rank | Project Title | Estimated Cost |
|---------------------------|------------------------|---------------------|---|-----------------------|
| Wheeler | 04135790 | NR | Repair Hickory Hills Boat Ramp Parking Area | \$315,000 |
| Wheeler | 04135793 | NR | Repair Bluff City Boat Ramp Parking Area | \$26,000 |
| Wheeler | 04135796 | NR | Repair Cotaco Creek Boat Ramp Parking Area | \$353,000 |
| Wheeler | 04135800 | NR | Repair Truck Trail Spur (Suzie Hole) Parking Area | \$14,000 |
| Wheeler | 04135806 | NR | Repair Beaverdam Peninsula Tower Parking Area | \$64,000 |
| Wheeler | 04135817 | NR | Repair Handicapped Fishing Access Road (0.07 mi.) | \$11,000 |
| LARGE CONSTRUCTION | | | | |
| Wheeler | 00110156 | 1 | Construct a new Refuge Headquarters Administrative Building | \$795,000 |
| Wheeler | 00110155 | 2 | Construct Environmental Education Center | \$795,000 |
| SMALL CONSTRUCTION | | | | |
| Wheeler | 00124023 | 1 | Construct Cave Exhibit | \$80,000 |
| Wheeler | 00124021 | 2 | Construct Cave Springs Kiosk and Viewing Platform | \$31,000 |
| Wheeler | 97123406 | 3 | Construct Refuge Wildlife Drive | \$3,000,000 |

PROPOSED PROJECTS

| Station | Project Title | One-time Cost | Annual Cost |
|-----------------|---|---------------|-------------|
| Wheeler Complex | Control Feral Hogs | \$30,000 | \$15,000 |
| Sauta Cave | Conduct a Forest Management Study at Sauta Cave NWR to Evaluate Price's Potato-Bean Response to Various Forest Thinning Techniques | \$70,000 | \$10,000 |
| Wheeler Complex | Develop an Invasive Plant Species Program to Control Invasive Plants on Wheeler Complex | \$35,000 | \$5,000 |
| Wheeler Complex | Increase Force-Account (Using Complex Staff and Equipment) Farming Capabilities | 300,000 | \$100,000 |
| Key Cave | Improve the Water Holding Capacity of Three (3) Shallow Water Areas at Key Cave NWR | \$30,000 | \$5,000 |
| Wheeler Complex | Increase Law Enforcement Capabilities by Purchasing Specialized Surveillance Equipment | \$10,000 | \$1,000 |
| Wheeler Complex | Establish a Contaminants Program | \$125,000 | \$80,000 |
| Wheeler Complex | Develop a Complex-Wide Litter Control and Reduction Program | \$15,000 | \$4,000 |
| Wheeler Complex | Conduct a Study to Analyze Existing Rights-of-Ways | \$10,000 | \$1,000 |
| Wheeler Complex | Develop a Cultural Resource Overview of the Wheeler Complex | \$20,000 | \$0 |
| Wheeler Complex | Conduct a Comprehensive Cultural Resource Inventory of the Wheeler Complex | \$150,000 | \$15,000 |
| Wheeler | Construct a Self Service Deer Weigh-In / Health Check Station | \$60,000 | \$3,000 |
| Wheeler | Increase Wildlife Observation and Photography by Constructing an Additional Wildlife Observation Tower | \$60,000 | \$2,000 |
| Wheeler | Increase Wildlife Observation and Photography by Constructing a Wildlife Photography Blind on the North Side of the Tennessee River | \$10,000 | \$1,000 |

Appendix K. List of Preparers

Wheeler National Wildlife Refuge Complex
Comprehensive Conservation Plan

Dwight Cooley, Project Leader, Wheeler National Wildlife Refuge, Decatur, Alabama
Emery Hoyle, Deputy Project Leader, Wheeler National Wildlife Refuge, Decatur, Alabama
John Beck, Natural Resource Planner, Wheeler National Wildlife Refuge, Decatur, Alabama
Steve Seibert, Assistant Refuge Manager, Wheeler National Wildlife Refuge, Decatur, Alabama
Bill Gates, Wildlife Biologist, Wheeler National Wildlife Refuge, Decatur, Alabama
Teresa Adams, Supervisory Park Ranger, Wheeler National Wildlife Refuge, Decatur, Alabama

Appendix L. Priority Bird Species and Species Suites

BCR 24 priority species (B=Breeding, N=Non-breeding, T=transient, PB=Post-breeding; FE=Federally Endangered, FT=Federally Threatened, SL=listed in at least one State within BCR)

Tier I. SPECIES OF HIGH CONTINENTAL AND/OR REGIONAL CONCERN

(Regional Combined Score presented only for Tier I species)

Immediate Management

| | | | | | |
|--------------------------------------|----|-----------|------------------------------------|----|----------|
| Whooping Crane ¹ | 22 | T, FE, SL | Brown-headed Nuthatch ⁴ | 19 | B, N |
| Red-cockaded Woodpecker ² | 21 | B, N, FE | Cerulean Warbler | 19 | B, SL |
| Greater Prairie-Chicken ² | 20 | B, N, SL | Sedge Wren | 16 | B, SL |
| Swainson's Warbler | 20 | B, SL | Ruffed Grouse | 15 | B, N |
| Bachman's Sparrow | 20 | B, SL | Loggerhead Shrike | 15 | B, N, SL |
| Swallow-tailed Kite ³ | 19 | B, SL | Bewick's Wren | 15 | B, SL |
| King Rail | 19 | B, SL | Grasshopper Sparrow | 15 | B |
| Least Tern | 19 | B, FE, SL | Lark Sparrow | 14 | B, SL |

Management Attention

| | | | | | |
|-------------------------|----|-------|----------------------------|----|-------|
| Buff-breasted Sandpiper | 24 | T | Least Sandpiper | 16 | T |
| American Black Duck | 19 | N | Dunlin | 16 | T, N |
| Yellow Rail | 19 | T | Black Tern | 16 | T |
| Blue-winged Warbler | 19 | B | Chimney Swift | 16 | B |
| American Golden-Plover | 18 | T | Red-headed Woodpecker | 16 | B, N |
| Upland Sandpiper | 18 | T, SL | Wood Thrush | 16 | B |
| Hudsonian Godwit | 18 | T | Yellow-breasted Chat | 16 | B |
| Semipalmated Sandpiper | 18 | T | Painted Bunting | 16 | B |
| American Woodcock | 18 | B, T | Yellow-crowned Night-Heron | 15 | B, SL |
| Wilson's Phalarope | 18 | T | Yellow-billed Cuckoo | 15 | B |
| Prairie Warbler | 18 | B | Eastern Wood-Pewee | 15 | B |
| Worm-eating Warbler | 18 | B, SL | Eastern Kingbird | 15 | B |
| Kentucky Warbler | 18 | B | White-eyed Vireo | 15 | B |
| Henslow's Sparrow | 18 | B, SL | Bell's Vireo | 15 | B, SL |
| Stilt Sandpiper | 17 | T | Brown Thrasher | 15 | B |
| Short-billed Dowitcher | 17 | T | Eastern Towhee | 15 | B |
| Short-eared Owl | 17 | N, SL | Eastern Meadowlark | 15 | N |
| Whip-poor-will | 17 | B | Lesser Scaup | 14 | N |
| Field Sparrow | 17 | B, N | Pied-billed Grebe | 14 | B, SL |
| Harris's Sparrow | 17 | N | Wood Stork | 14 | P, B |
| Orchard Oriole | 17 | B | American Coot | 14 | B, SL |
| Northern Bobwhite | 16 | B, N | Sanderling | 14 | T |
| Horned Grebe | 16 | N, B | Common Tern | 14 | T |
| American Bittern | 16 | T, SL | Northern Flicker | 14 | B, N |
| Least Bittern | 16 | B, SL | Blue-gray Gnatcatcher | 14 | B |
| Lesser Yellowlegs | 16 | T | Rusty Blackbird | 14 | N |
| Western Sandpiper | 16 | T | | | |

Planning and Responsibility

| | | | | | |
|--------------------|----|---|----------------------|----|---|
| Smith's Longspur | 17 | N | Prothonotary Warbler | 14 | B |
| Solitary Sandpiper | 16 | T | Dickcissel | 13 | B |
| Wilson's Snipe | 16 | N | Willow Flycatcher | 12 | B |

Tier II. SPECIES NOT OTHERWISE OF CONTINENTAL NOR REGIONAL CONCERN WHERE MONITORING

(i.e., All Planning and Responsibility) ATTENTION IS NEEDED TO ENSURE POPULATION STABILITY

Planning and Responsibility

| | | | |
|------------------------|----------|---------------------------|------|
| Wood Duck | B, N | Downy Woodpecker | B, N |
| Sandhill Crane | N | Yellow-bellied Flycatcher | T |
| Black-bellied Plover | T | Acadian Flycatcher | B |
| Semipalmated Plover | T | Alder Flycatcher | T |
| Killdeer | B, N | Least Flycatcher | T |
| Black-necked Stilt | T | Yellow-throated Vireo | B |
| American Avocet | T | Philadelphia Vireo | T |
| Greater Yellowlegs | T | Carolina Chickadee | B, N |
| Spotted Sandpiper | B, T, SL | Tennessee Warbler | T |
| White-rumped Sandpiper | T | Yellow-throated Warbler | B |
| Baird's Sandpiper | T | Blackburnian Warbler | T |
| Pectoral Sandpiper | T | Louisiana Waterthrush | B |
| Long-billed Dowitcher | T | Summer Tanager | B |
| Red Phalarope | T | Le Conte's Sparrow | N |
| Red-necked Phalarope | T | | |

Tier III. SPECIES WHERE AT LEAST MONITORING ATTENTION IS NEEDED TO ENSURE POPULATION PERSISTENCE

(i.e., All at least Planning and Responsibility), BUT MANAGEMENT ATTENTION MAY OR MAY NOT BE NECESSARY BASED ON LEGAL REQUIREMENTS AND POLITICAL BOUNDARIES

Tier III a. Additional Federally Listed

| | | | |
|------------|--------------|---------------|-----------|
| Bald Eagle | B, N, FT, SL | Piping Plover | T, FT, SL |
|------------|--------------|---------------|-----------|

Tier III b. Additional State Listed

| | | | |
|---------------------------|---|---------------------|---|
| Trumpeter Swan | N | Osprey | B |
| Blue-winged Teal | B | Mississippi Kite | B |
| Northern Shoveler | B | Northern Harrier | B |
| Hooded Merganser | B | Sharp-shinned Hawk | B |
| Double-crested Cormorant | B | Cooper's Hawk | B |
| Great Blue Heron | B | Red-shouldered Hawk | B |
| Great Egret | B | Broad-winged Hawk | B |
| Snowy Egret | B | Peregrine Falcon | B |
| Little Blue Heron | B | Virginia Rail | B |
| Cattle Egret | B | Sora | B |
| Black-crowned Night Heron | B | Common Moorhen | B |

Tier III b. Additional State Listed (Cont'd)

| | | | |
|----------------|------|-------------------------|---|
| Barn Owl | B, N | Marsh Wren | B |
| Long-eared Owl | B | Black-and-white Warbler | B |
| Fish Crow | B | Hooded Warbler | B |
| Tree Swallow | B | Vesper Sparrow | B |
| Bank Swallow | B | Savannah Sparrow | B |
| Brown Creeper | B | Bobolink | B |

Tier III c. Additional politically recognized species

(e.g., Natureserve B=Breeding, N=Non-breeding, X=not seasonally ranked, S1=State highly imperiled, S2=State imperiled, S3=State vulnerable)

| Species | | AL | AR | IL | IN | State KY | MO | OH | OK | TN |
|------------------------------|---|-----------|-----------|-----------|-----------|---------------------|-----------|-----------|-----------|-----------|
| Black-bellied Whistling-Duck | B | | S1 | | | | | | | |
| Fulvous Whistling-Duck | B | | S1 | | | | | | | |
| Greater White-fronted Goose | N | S3 | | | | | | | S3 | S3 |
| Snow Goose | N | S3 | | | | S3S4 | | | | |
| Canada Goose | B | S3 | | | | S3S4 | | | | |
| Trumpeter Swan | N | | S1 | S2 | | | | | | |
| Tundra Swan | N | | | | | | | | | S3 |
| Wood Duck | N | | | | S1 | | | | | |
| American Black Duck | B | S2 | | | | | | | | |
| | N | | | | | | | S2 | | S3S4 |
| | X | | | | S1 | | | S2 | | |
| Mallard | B | S3 | | | | S3S4 | | | | |
| Blue-winged Teal | B | S2 | | | | S2S3 | | | | S2 |
| | X | | | S3 | | | | S3 | | |
| Northern Shoveler | B | S2 | | | | | | | | |
| | X | | | S1 | | S1 | | | | |
| Northern Pintail | N | | | | S1 | | | | | |
| | X | | | S1 | | | | | | |
| Green-winged Teal | B | | | | S1 | | | | | |
| | N | | | | S1 | | | | | |
| Canvasback | N | | | | | S3 | | | | S3S4 |
| Redhead | B | | | | S1 | | | | | |
| | N | | S3 | | | | | | | |
| Greater Scaup | N | | | | S3 | S2S3 | | | | |
| Harlequin Duck | N | | | | S1 | | | | | |
| Surf Scoter | N | S3 | | | S1 | | | | | S3 |
| White-winged Scoter | N | S3 | | | S1 | | | | | S3 |
| Black Scoter | N | S3 | | | S1 | | | | | S3 |
| Long-tailed Duck | N | S3 | | | S1 | | | | S1 | S3 |
| Common Goldeneye | N | | S3 | | | S3 | | | | |
| Hooded Merganser | B | S3 | S2 | | S2S3 | S1S2 | | | | |
| | N | | | | | S3S4 | | | S3 | |
| | X | | | S2S3 | | | | S2 | | |
| Common Merganser | N | S3 | | | S3 | S3 | | | | |
| Red-breasted Merganser | N | | | | S2 | | | | | |

| Species | | AL | AR | IL | IN | KY | MO | OH | OK | TN |
|----------------------------|---|----|------|------|----|------|----|------|----|------|
| Ruddy Duck | B | | S3 | | S1 | | | | | |
| | X | | | S2 | | | | | | |
| Ruffed Grouse | X | S1 | | S3 | | | | | | |
| Greater Prairie-Chicken | X | | | S1 | | | S1 | | S3 | |
| Northern Bobwhite | X | | | | | | | | | S2S3 |
| Red-throated Loon | N | S3 | | | | | | | | S3 |
| Common Loon | N | | S3 | S2 | | | | | | S3 |
| Pied-billed Grebe | B | S3 | S2 | | S3 | S1 | | | | |
| | X | | | S3 | | | S3 | S2S3 | | S2 |
| Red-necked Grebe | N | | | | | | | | S1 | S3 |
| Eared Grebe | N | S3 | S3 | | | | | | | S3 |
| American White Pelican | N | S3 | | | | | | | S3 | S3 |
| Neotropic Cormorant | X | | S1 | | | | | | | |
| Double-crested Cormorant | B | | | | | S1 | | | | S2 |
| | X | | | S2 | | | | S1 | | |
| Anhinga | B | S3 | | | | | | | | S1 |
| American Bittern | B | | | | S2 | | | | | |
| | N | S3 | S2 | | | | | | | |
| | X | | | S1S2 | | | S1 | S2 | | S1 |
| Least Bittern | B | | S2 | | S3 | S1S2 | | | | S2 |
| | N | S2 | S2 | | | | | | | |
| | X | | | S2 | | | S3 | S2 | | |
| Great Blue Heron | B | | S3 | | | S3 | | | | |
| Great Egret | B | | S2S3 | | S1 | S1 | | | | S2 |
| | N | | | | | | | | | S3 |
| | X | | | S3 | | | S3 | S1 | | |
| Snowy Egret | B | | S2 | | | S1 | | | | S2 |
| | N | | | | | | | | | S3 |
| | X | | | S1 | | | | S1 | | |
| Little Blue Heron | B | | S2 | | | S1 | | | | S2 |
| | N | S3 | | | | | | | | S3 |
| | X | | | S1 | | | S2 | S1 | | |
| Tricolored Heron | B | | S3 | | | | | | | |
| | N | S3 | S3 | | | | | | | |
| Cattle Egret | B | | | | | S1S2 | | | | S2 |
| | N | S3 | | | | | | | | S3 |
| | X | | | S3S4 | | | | S1 | | |
| Green Heron | B | | S3 | | | | | | S2 | |
| Black-crowned Night-Heron | B | S3 | S2 | | S1 | S1S2 | | | S3 | S2S3 |
| | N | | S3 | | | | | | | |
| | X | | | S2 | | | S3 | S1 | | |
| Yellow-crowned Night-Heron | B | | S3 | | S2 | S2 | | | | |
| | N | S2 | | | | | | | | |
| | X | | | S1 | | | | S1 | | S3 |
| White Ibis | B | | S1 | | | | | | | |
| | N | S3 | | | | | | | | S3 |
| Glossy Ibis | B | S1 | | | | | | | | |
| | N | S3 | | | | | | | | S3 |

| Species | | AL | AR | IL | IN | KY | MO | OH | OK | TN |
|---------------------|---|----|------|------|----|------|----|------|----|------|
| Wood Stork | N | S2 | | | | | | | | S3 |
| Black Vulture | B | | | | S2 | | | | | |
| | N | | | | S1 | S3S4 | | | | |
| | X | | | S3 | | | S3 | | | |
| Turkey Vulture | N | | | | S1 | | | | | |
| Osprey | B | | S1 | | S1 | S2 | | | | S3 |
| | N | | | | | | | | S2 | |
| | X | | | S1 | | | | | | |
| Swallow-tailed Kite | X | S2 | | | | | | | | |
| Mississippi Kite | B | | | | S1 | S2 | | | | |
| | X | S3 | | S2S3 | | | S3 | | | S2S3 |
| Bald Eagle | B | S3 | S2 | S2 | | S2 | | | | |
| | N | | | S3 | | S2S3 | | | | |
| | X | | | | S2 | | S3 | S2 | | S3 |
| Northern Harrier | B | S2 | S1 | S2 | | S1S2 | | | | |
| | N | S3 | | S3 | | | | | | |
| | X | | | | S2 | | S2 | | | |
| Sharp-shinned Hawk | B | S3 | S1S2 | | S2 | S3 | | | | S3 |
| | X | | | S1S2 | | | S3 | S3 | | |
| Cooper's Hawk | B | S3 | S1 | | S3 | | | | | S3 |
| | N | | S3 | | | | | | | |
| | X | | | S3 | | | S3 | S3S4 | | |
| Goshawk | N | | | | | | | | S2 | S2 |
| Red-shouldered Hawk | X | | S3 | S2S3 | S3 | | | S3 | | |
| Broad-winged Hawk | B | | | | S3 | | | | | |
| | X | | | S3 | | | S3 | | | |
| Swainson's Hawk | B | | S1 | | | | | | | |
| | N | S2 | | | | | | | | |
| | X | | | S1 | | | | | | |
| Rough-legged Hawk | N | S3 | | | | S3 | | | | S3 |
| Golden Eagle | N | | S3 | | S1 | S2 | | | | |
| | X | | | | | | | | S2 | S1 |
| American Kestrel | B | S2 | S3S4 | | | | | | | |
| Merlin | N | | | | S1 | | | | | S3 |
| Peregrine Falcon | B | | | | S2 | S1 | | | | |
| | N | S3 | S1 | | | | | | | S1 |
| | X | | | S1 | | | S1 | S1 | | |
| Yellow Rail | N | S2 | | S2 | | | | | | |
| Black Rail | B | | | | | | | | S1 | |
| | N | S2 | | | | | | | | |
| | X | | | S1 | | | S1 | | | S1 |
| King Rail | B | S3 | S1 | | S1 | S1 | | | S1 | |
| | N | | S3 | | | | | | | |
| | X | | | S2 | | | S1 | S1 | | S2 |
| Virginia Rail | B | | | | S3 | S1 | | | S1 | S1 |
| | N | | S2 | | | | | | | S3 |
| | X | | | S3 | | | S2 | S3 | | |

| Species | | AL | AR | IL | IN | KY | MO | OH | OK | TN |
|-------------------------|-------------|----------|----------|------|------|------|----|------|----------|----------|
| Sora | B X | | | S3 | | | S2 | S3 | | S1 |
| Purple Gallinule | B X | S3 | S1 | | | | | | | S1 |
| Common Moorhen | B N | | S1 S2 | | S3 | S1S2 | | | S1 S2 | S1 |
| American Coot | X B N | S2 | S3 | S3 | | S1 | S2 | S3 | | S2 |
| Sandhill Crane | X B N | | | | S3 | S1 | | S2 | S1 | S1 S3 |
| American Golden-Plover | X N | | | S3 | | | S2 | S3 | | S3 |
| Piping Plover | N | S1 | | | | | | | S2 | S2 |
| Black-necked Stilt | B X | S1 | | S1 | | | | | | |
| American Avocet | B N | | | | | | | | S2 | |
| Willet | B N | S3 S2 | | | | | | | | S3 |
| Spotted Sandpiper | B X | | | | | S1 | | | S3 | S3 S2 |
| Upland Sandpiper | B X | | | S3S4 | S3 | | S3 | S2 | | |
| Whimbrel | N | S3 | | | | | | | S1 | |
| Hudsonian Godwit | N | S2 | | | | | | | S2 | |
| Marbled Godwit | N | S3 | | | | | | | S2 | |
| Ruddy Turnstone | N | | | | | | | | S2 | S3 |
| Red Knot | N | S3 | | | | | | | S1 | S2 |
| Sanderling | N | | S3 | | | | | | S3 | |
| Baird's Sandpiper | N | | | | | | | | | S3 |
| Dunlin | N | | | | | | | | S2 | S3 |
| Stilt Sandpiper | N | | | | | | | | S3 | S3 |
| Buff-breasted Sandpiper | N | | | | | | | | | S3 |
| Short-billed Dowitcher | N | | | | | | | | S1 | S3 |
| Long-billed Dowitcher | N | | | | | | | | | S2 |
| Wilson's Snipe | B X | | | | S1S2 | | | | | |
| American Woodcock | B X | | S2 | S3 | | | | S2S2 | | |
| Wilson's Phalarope | N X | | | S1 | | | | | S3 | S3 |
| Red Phalarope | N | S3 | | | | | | | S1 | |
| Laughing Gull | N | | | | | | | | S1 | S3 |
| Franklin's Gull | N | S3 | | | | | | | | |
| Ring-billed Gull | X | | | S2 | | | | S3 | | |
| Herring Gull | N X | | S3 | | S2 | | | | S3 | |

| Species | | AL | AR | IL | IN | KY | MO | OH | OK | TN |
|---------------------------|---|----|----|------|----|------|----|------|----|------|
| Caspian Tern | B | S2 | | | | | | | | |
| | N | | | | | | | | S2 | |
| Common Tern | B | S1 | | | | | | | | |
| | N | | | | | | | | S1 | S3 |
| Forsters Tern | X | | | S1 | | | | S1 | | |
| | B | S1 | | | | | | | | |
| | N | | | | | | | | | S3 |
| | X | | | S1 | | | | | | |
| Least Tern | B | S2 | | | | | | | S2 | S2S3 |
| | X | | | S1 | | S2S2 | S1 | | | |
| Black Tern | B | | | | S1 | | | | | |
| | X | | | S1 | | | | S1 | | |
| Common Ground Dove | X | S3 | | | | | | | | |
| Black-billed Cuckoo | B | | S1 | | | S3S4 | | | S1 | S2 |
| Greater Roadrunner | X | | | | | | S3 | | | |
| Barn Owl | B | | S2 | | | | | | | |
| | N | | S3 | | | | | | | |
| | X | S3 | | S1S2 | S2 | S3 | S3 | S2 | S3 | S3 |
| Burrowing Owl | N | S2 | S2 | | | | | | | |
| | X | | | | | | | | S2 | |
| Long-eared Owl | B | | | S1 | | S1 | | | | |
| | N | | S3 | S2 | | S1S2 | | | | S2 |
| | X | | | | S2 | | | S1S2 | S1 | |
| Short-eared Owl | B | | | S1 | | S1 | | | | |
| | N | | | S2S3 | | S2 | | | | S3 |
| | X | | | | S2 | | S2 | | | |
| Northern Saw-whet Owl | X | | | S1 | | | | | | S1 |
| Common Nighthawk | B | | S3 | | | | | | | |
| Chuck-wills-widow | B | | | | S3 | | | | | |
| | X | | | | | | | S2 | | S3S4 |
| Whip-poor-will | B | | | | | | | | S2 | |
| | N | S3 | | | | | | | | |
| | X | | | | | | | | | S3S4 |
| Belted Kingfisher | X | | S3 | | | | | | | |
| Yellow-bellied Sapsucker | B | | | | S2 | | | | | S1 |
| | N | | | | | S3S4 | | | S3 | |
| | X | | | S1S2 | | | | S1 | | |
| Olive-sided Flycatcher | N | | | | | | | | S2 | |
| | X | | | | | | | | | S1 |
| Yellow-bellied Flycatcher | N | | | | | | | | S2 | S3 |
| Alder Flycatcher | B | | | | S2 | | | | S2 | |
| | N | | | | | | | | S2 | |
| | X | | | S2 | | | | S3 | | S1 |
| Willow Flycatcher | B | | S1 | | | S3S4 | | | | |
| | N | | S3 | | | | | | | |
| | X | | | | | | S3 | | | S2S3 |
| Least Flycatcher | B | | | | S3 | S1 | | | | |
| | X | | | S3 | | | | S3 | | S3 |

| Species | | AL | AR | IL | IN | KY | MO | OH | OK | TN |
|---------------------------|---|----|----|------|------|------|----|----|----|----|
| Western Kingbird | B | | S1 | | | | | | | |
| | N | | S1 | | | | | | | |
| | X | | | S1 | | | | | | |
| Scissor-tailed Flycatcher | B | S1 | | | | | | | | S1 |
| | N | S2 | | | | | | | | |
| Loggerhead Shrike | B | S3 | | | S3 | | | | | |
| | X | | | S3 | | | S2 | S2 | | S3 |
| Northern Shrike | N | | | | S1S2 | | | | | |
| White-eyed Vireo | N | S3 | | | | | | | | |
| Bell's Vireo | B | | S3 | | S3 | S2S3 | | | S3 | |
| | X | | | | | | S3 | | | |
| Blue-headed Vireo | B | S2 | | | | S3S4 | | | | |
| | N | | | | | | | | S2 | |
| | X | | | S1 | | | | S2 | | |
| Warbling Vireo | B | S1 | | | | | | | | |
| Philadelphia Vireo | N | | S2 | | | | | | S1 | S2 |
| Fish Crow | B | | | | | S3 | | | | |
| | X | | | S2 | | | | | S1 | S3 |
| Horned Lark | B | S3 | | | | | | | | |
| Bank Swallow | B | | S2 | | | S3 | | | S2 | |
| | N | | S3 | | | | | | | |
| | X | | | | | | | | | S3 |
| Cliff Swallow | B | | | | S3 | S3S4 | | | | |
| | X | | | | | | | S3 | | |
| Black-capped Chickadee | B | | | | | | | | | S2 |
| Red-breasted Nuthatch | B | | | | S1 | S1 | | | | S2 |
| | N | | | | | | | | S2 | |
| | X | | | S1 | | | | | | |
| Brown-headed Nuthatch | B | | | | | | | | | S2 |
| | X | | | | | | | | S1 | |
| Brown Creeper | B | | S1 | | S2 | S1S2 | | | | S2 |
| | X | | | S3 | | | | S3 | | |
| Rock Wren | N | | S2 | | | | | | | |
| Bewick's Wren | B | | S2 | | S1 | S3 | | | | |
| | N | | S3 | | | | | | | |
| | X | S1 | | S1 | | | S3 | S1 | | S1 |
| House Wren | B | S1 | | | | | | | | |
| Winter Wren | B | | | | | | | | | S3 |
| | N | | | | | | | | S2 | |
| | X | | | | | | | S1 | | |
| Sedge Wren | B | S1 | | | S3 | S3 | | | | |
| | N | | | | | | | | S2 | S3 |
| | X | | | S3S4 | | | S3 | S2 | | |
| Marsh Wren | B | | | | S3 | | | | | |
| | N | | | | | | | | S2 | S3 |
| | X | | | | | | S3 | S3 | | |

| Species | | AL | AR | IL | IN | KY | MO | OH | OK | TN |
|------------------------------|---|----|------|------|------|------|------|------|----|------|
| Golden-crowned Kinglet | B | | | | | | | | | S3 |
| | N | | | | | | | | S3 | |
| | X | | | S1 | | | | | | |
| Blue-gray Gnatcatcher | N | S3 | | | | | | | | |
| | X | | | S3 | | | | | | |
| Veery | B | | | | S3 | S3S4 | | | | |
| | N | | S2 | | | | | | | |
| Hermit Thrush | B | | | | | | | | | S2 |
| | N | | | | | S3S4 | | | S3 | |
| | X | | | | | | | S1 | | |
| Gray Catbird | B | | S3 | | | | | | | |
| Cedar Waxwing | B | S2 | S1 | | | | | | | |
| Blue-winged Warbler | B | S3 | S3 | | | | | | S1 | |
| Gold-winged Warbler | B | | | | S1 | S2 | | | | S3 |
| | N | | S2 | | | | | | | |
| | X | | | S1S2 | | | | | | |
| Orange-crowned Warbler | N | | | | | | | | | S3 |
| Nashville Warbler | X | | | S1 | | | | | | |
| Northern Parula | B | | | | | | | | S3 | |
| | X | | | | | | | S3 | | |
| Yellow Warbler | B | | S3 | | | | | | S3 | |
| Chestnut-sided Warbler | B | | S1 | | S3 | S3S4 | | | | |
| | N | | | | | | | | S2 | |
| | X | | | S2S3 | | | S3 | S3 | | |
| Magnolia Warbler | B | | | | | | | | | S1 |
| | N | | | | | | | | S2 | |
| | X | | | | | | | S1 | | |
| Black-throated Green Warbler | B | | S2 | | S2 | | | | | |
| | N | | | | | | | | S3 | |
| | X | | | | | | | S3 | | |
| Blackburnian Warbler | B | | | | | S1S2 | | | | S3 |
| | N | | | | | | | | S2 | |
| | X | | | | | | | S1 | | |
| Yellow-throated Warbler | B | | | | | | | | S2 | |
| | N | S3 | | | | | | | | |
| Pine Warbler | B | | | | S3 | | | | | |
| | X | | | S3S4 | | | | S3S4 | | |
| Kirtland's Warbler | N | | | | | | | S1 | | |
| Prairie Warbler | B | | | | | | | | S3 | |
| | X | | | | | | | | | S3S4 |
| Cerulean Warbler | B | S1 | | | S3 | | | | S2 | S3 |
| | X | | | S3 | | | S2S3 | | | |
| Black-and-white Warbler | B | | | | S1S2 | | | | | |
| | N | S3 | | | | | | | | |
| | X | | | S2S3 | | | | | | |
| American Redstart | B | | S3S4 | | | | | | S3 | |
| Prothonotary Warbler | X | | | | | | | S3 | | |

| Species | | AL | AR | IL | IN | KY | MO | OH | OK | TN |
|------------------------|---|----|------|------|------|------|------|------|----|----|
| Worm-eating Warbler | B | S3 | | | S3 | | | | S1 | |
| | X | | | | | | | S3S4 | | |
| Swainson's Warbler | B | S3 | | | | S3S4 | | | S1 | |
| | X | | | S1 | | | S2 | | | S3 |
| Ovenbird | B | | | | | | | | S2 | |
| | N | S2 | | | | | | | | |
| Northern Waterthrush | N | | | | | | | | S2 | |
| | X | | | | | | | S1S2 | | |
| Connecticut Warbler | N | | | | | | | | S1 | S3 |
| Mourning Warbler | N | | | | | | | | S2 | S3 |
| | X | | | S1S2 | | | | S1 | | |
| Common Yellowthroat | N | | S3 | | | | | | | |
| Hooded Warbler | B | | | | S3 | | | | S2 | |
| | X | | | S3S4 | | | S3 | | | |
| Wilson's Warbler | N | | | | | | | | | S3 |
| Canada Warbler | B | | | | S2 | S3 | | | | S3 |
| | N | | | | | | | | S1 | |
| | X | | | S1 | | | | S2 | | |
| Yellow-breasted Chat | N | S2 | | | | | | | | |
| Eastern Towhee | X | | S3 | | | | | | | |
| Bachman's Sparrow | B | | S3 | | | S1 | | | | |
| | X | S3 | | | | | S2 | | S2 | S2 |
| Rufous-crowned Sparrow | X | | S1 | | | | | | | |
| American Tree Sparrow | N | | | | | S3S4 | | | | S3 |
| Clay-colored Sparrow | N | S3 | | | | | | | | |
| | X | | | S1 | | | | | | |
| Vesper Sparrow | B | | | | | S1 | | | | S1 |
| | N | | S3 | | | | | | | |
| Lark Sparrow | B | S3 | S3S4 | | S3 | S2S3 | | | | S1 |
| | X | | | | | | | S1 | | |
| Savannah Sparrow | B | | | | | S2S3 | | | | S1 |
| | N | | | | | S2S3 | | | | |
| Grasshopper Sparrow | B | | S3 | | | | | | | |
| | X | S3 | | | | | S3S4 | | | |
| Henslow's Sparrow | N | S3 | S3S4 | | | | | | | S1 |
| Le Conte's Sparrow | N | S3 | S3S4 | | | | | | | S1 |
| Fox Sparrow | N | | | | S2 | | | | S3 | S3 |
| Song Sparrow | B | S3 | | | | | | | | |
| Lincoln's Sparrow | N | S3 | | | S1S2 | | | | | S3 |
| Swamp Sparrow | N | | | | S3 | | | | S2 | |
| Harris's Sparrow | N | | S3 | | S1 | | | | | |
| Dark-eyed Junco | B | | | | | S2S3 | | | | |
| | X | | | | | | | S2 | | |
| Lapland Longspur | N | S3 | | | S2S3 | | | | | S3 |
| Smith's Longspur | N | | S3 | | | | | | | S2 |
| Snow Bunting | N | | | | S3 | | | | | S2 |
| Blue Grosbeak | B | | | | S3 | | | | | |
| | X | | | | | | | S3 | | |

| Species | | AL | AR | IL | IN | KY | MO | OH | OK | TN |
|-------------------------|---|----|----|----|------|------|----|----|----|------|
| Indigo Bunting | N | S2 | | | | | | | | |
| Painted Bunting | B | S2 | | | | | | | | |
| | X | | | | | | S3 | | | S2 |
| Dickcissel | N | S2 | | | | | | S3 | | |
| | X | | | | | | | | | |
| Bobolink | B | | | | | S2S3 | | | S2 | |
| | N | | S3 | | | | | | | |
| | X | | | | | | S3 | | | |
| Eastern Meadowlark | N | | | | S3 | | | | | |
| | X | | | | | | | | | |
| Western Meadowlark | B | | | | S2 | | | | | |
| | N | | | | | | | | | S2 |
| | X | | | | | | | S2 | | |
| Yellow-headed Blackbird | B | | | | S1 | | | | | |
| | N | | | | | | | | S3 | |
| | X | | | S2 | | | S3 | | | |
| Rusty Blackbird | N | | | | S2S3 | S3S4 | | | S3 | |
| Brewer's Blackbird | N | | | | S1 | | | | | S3 |
| | X | | | S1 | | | | | | |
| Great-tailed Grackle | X | | S3 | | | | | | | |
| Orchard Oriole | B | | | | S3 | | | | | |
| Baltimore Oriole | B | S3 | | | | | | | | |
| | N | | S3 | | | | | | | |
| Pine Grosbeak | N | | | | S1S2 | | | | | |
| Purple Finch | N | | | | S3 | | | | | S3S4 |
| | X | | | | | | | S3 | | |
| Red Crossbill | B | S1 | | | | | | | | S1 |
| | N | | S3 | | S1 | | | | S1 | S2 |
| | X | | | S1 | | | | | | |
| White-winged Crossbill | | N | | | | S1 | | | | |
| Common Redpoll | N | | | | S3 | | | | | |
| Pine Siskin | N | | | | S3 | | | | | |
| | X | | | S2 | | | | | | |
| Evening Grosbeak | N | S3 | | | S3 | | | | S2 | |

Tier IV. OTHER SPECIES OF CONSERVATION OR MANAGEMENT INTEREST, NOT OTHERWISE LISTED ABOVE

(LOCAL OR REGIONAL INTEREST=LORI species; some species may be listed in more than one sub-tier below)

Tier IV a. Locally Rare or Peripheral Species of Interest

(e.g., certain nonbreeding hummingbird species found in the Southeast U.S., Continental Concern species with RD=1)

| | | | | | | | | |
|---------------------------|------|--|--|--|--|-------------------------|--|---|
| Common Loon | T, N | | | | | Yellow Warbler | | B |
| Willow Flycatcher | B | | | | | Black-and-white Warbler | | B |
| Scissor-tailed Flycatcher | B | | | | | American Redstart | | B |
| Warbling Vireo | B | | | | | | | |

Tier IV b. Game Species of Particular Local or State Management or Economic Interest

(e.g., Wild Turkey, many species of waterfowl)

| | | | |
|-------------------|------|-------------------|------|
| Canada Goose | N | Ring-necked Duck | N |
| Wood Duck | B, N | Lesser Scaup | N |
| Gadwall | N | Wild Turkey | B, N |
| American Wigeon | N | Northern Bobwhite | B, N |
| Am. Black Duck | B, N | Virginia Rail | N |
| Mallard | B, N | Sora | N |
| Blue-winged Teal | N | American Coot | N |
| Northern Shoveler | N | Mourning Dove | B, N |
| Green-winged Teal | N | | |

Tier IV c. Nongame Species of Particular Local or State Management or Economic Interest

(e.g., Ruby-throated Hummingbird, Purple Martin, Eastern Bluebird)

| | | | |
|------------------------|------|---------------------------|------|
| Am. White Pelican | N | Ruby-throated Hummingbird | B |
| Green Heron | B | Belted Kingfisher | B, N |
| Red-shouldered Hawk | B, N | Pileated Woodpecker | B, N |
| White-rumped Sandpiper | T | Scissor-tailed Flycatcher | B |
| Baird's Sandpiper | T | Eastern Bluebird | B, N |
| Bonaparte's Gull | N | Cerulean Warbler | B, T |
| Forster's Tern | T | Indigo Bunting | |
| Common Nighthawk | B | | |

Tier IV d. Species frequently occurring as a regional concern species in other BCRs, just not in this one, with RD>2

(good to keep track of species where they are doing well, in many BCR's they are not doing well)

| | |
|-------------------------|------|
| Chuck-will's-widow | B, N |
| Yellow-throated Vireo | B |
| Yellow-throated Warbler | B |
| Hooded Warbler | B |
| Summer Tanager | B |

Tier IV e. Species Important as Environmental Indicators

(e.g., many species of raptors, such as Osprey, and herons, such as Great Blue Heron)

| | |
|--------------------------|------|
| Double-crested Cormorant | B |
| Snowy Egret | B |
| Green Heron | B |
| Osprey | B |
| Great Blue Heron | B, N |
| Little Blue Heron | B |
| Yellow-cr. Night-Heron | B |

Tier IV f. Nuisance or Depredating Species

(e.g., crows, grackles, cowbirds, most blackbirds, double-crested cormorants)

Local or Regional Population Control/Suppression

Double-crested Cormorant breeding populations leading to habitat deterioration for other colonial nesting species in AL

Canada Goose resident populations leading to crop depredation

¹ Experimental non-essential population

² Extirpated.

³ Extirpated. Once bred in bottomlands with forest components associated with large river systems.

⁴ Extirpated throughout much of the Central Hardwoods Bird Conservation Region. Small populations persist in the Boston Mountains in Arkansas. Appears to be re-established in pine habitat immediately north of the Tennessee River in Alabama.

*Action Level:

***IM**=Immediate management needed to reverse or stabilize significant, long-term population declines in species with small populations, or to protect species with the smallest populations for which trends are poorly known. Lack of action may lead to extirpations or extinction. Generally species with a TB/TN=5 or a TB/TN=4+PT=5 fall under this action level.*

***MA**=Management or other on-the-ground conservation actions needed to reverse or stabilize significant, long-term population declines in species that are still relatively abundant. All other Regional Concern species that are not IM, fall under this action level. Some federally or state/provincial listed species not otherwise meeting either Continental or Regional Concern criteria may fall under this action level.*

***PR**=Long-term Planning and Responsibility needed for species to ensure that sustainable populations are maintained for species for which a region has high responsibility for that species. All Continental Concern species that are not also Regional Concern species fall under this action level, as well as any additional Regional Stewardship and Continental Stewardship species and any additional LORI species identified.*

***PC** = Population Control/Suppression needed for species that are otherwise secure and increasing that may come into conflict with other species of higher conservation concern or other resources of interest.*

***PCL** = Local or Regional Population Control/Suppression that generally are species listed as in need of Management Attention or Long-term Planning and Responsibility, but locally may be subject to population control measures to alleviate documented economic, environmental, or human health and safety conflicts, but only when economics and conservation implications have been thoroughly considered.*

Appendix M. Relationship of the Wheeler Complex Cooperative Conservation Plan to the Alabama Comprehensive Wildlife Conservation Strategy

(+ contributes to or supports Conservation Action, - does not contribute to or support Conservation Action, N – not applicable).

| Alabama Comprehensive Wildlife Conservation Strategy | ALTERNATIVES | | | | | | | | | | | | | | | |
|---|--------------|---|---|---|----------|---|---|---|------------|---|---|---|-----------|---|---|---|
| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| Statewide Conservation Actions — All Habitats | | | | | | | | | | | | | | | | |
| S1. DWFF should provide information on GCN species, their habitats and conservation needs to appropriate water and land use decision-makers. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| S2. DWFF should develop an effective data management system and network to provide for efficient data input and monitoring of information on GCN species, key habitats, threats, and conservation actions in order to fully implement and update this CWCS. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| S3. ADCNR and other land management agencies should use a landscape management approach to enhance GCN species and their habitats. | + | - | + | + | + | - | + | + | + | - | + | + | + | - | + | + |
| S4. DWFF should produce a formal revision of this CWCS (an action plan for all GCN species and their key habitats) every ten years. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| S5. DWFF should include as many imperiled animal taxa in updates and revisions of this CWCS as possible. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |

| Alabama Comprehensive Wildlife Conservation Strategy | ALTERNATIVES | | | | | | | | | | | | | | | |
|---|--------------|---|---|---|----------|---|---|---|------------|---|---|---|-----------|---|---|---|
| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| S6. DWFF should enhance wildlife protection regulations to address all GCN wildlife species. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| S7. DWFF should review and update the permitting process for collection of wildlife species in Alabama to insure adequate conservation of GCN species. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| S8. DWFF SWG Steering and Technical Committees should review and provide recommendations to prioritize research studies and management actions for GCN species and their habitats. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| S9. ADCNR Divisions should coordinate wildlife management to most effectively conserve GCN species and their habitats on lands under their jurisdiction. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| S10. DWFF should expand its education and outreach programs regarding the importance and sensitivity of GCN species and all wildlife species found in the state. | - | + | - | + | - | + | - | + | - | + | - | + | - | + | - | + |
| Statewide Conservation Actions — Terrestrial and Estuarine Habitats | | | | | | | | | | | | | | | | |
| S11. Identify any extensive (at least 400-hectare; 1,000-acre) forested natural communities and contact landowners to seek protection of the system through outright willing seller purchase and/or conservation easements. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| S12. Where present, maintain native community structure and composition. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S13. Where absent, restore native community structure and composition. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S14. Allow dead trees and woody debris to decompose naturally on the ground. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

| Alabama Comprehensive Wildlife Conservation Strategy | ALTERNATIVES | | | | | | | | | | | | | | | |
|---|--------------|---|---|---|----------|---|---|---|------------|---|---|---|-----------|---|---|---|
| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| S15. If logging is conducted, minimize soil disturbances from thinning and harvesting activities by conducting harvests during drier seasons and/or through use of low-tire-pressure equipment. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S16. Exclude logging, grazing, development, mechanized vehicle trails, and other erosion-generating activities uphill from biologically significant sites. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S17. For critical and unique habitats embedded in a forest matrix, identify, retain, and avoid disturbances (e.g., roads, firebreaks, trails) near such embedded habitats. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S18. Maintain or, where feasible, restore contiguous gradients (ecotones) into adjacent habitats such as floodplain forests. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S19. Exclude, and when necessary and feasible, remove exotic plant and animal species. | + | - | + | + | + | - | + | + | + | - | + | + | + | - | + | + |
| S20. If necessary to establish wildlife openings or other enhancements for wildlife species within natural forest stands, use sites of previous disturbance or choose new sites that mimic natural disturbances to avoid unwanted impacts. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S21. Minimize construction of access roads and all-terrain-vehicle trails to those absolutely necessary to conduct maintenance activities and to provide minimal access to the public; where possible, gate existing roads, particularly during critical times of the year, (e.g., breeding seasons). | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S22. Minimize publicity about biologically significant areas to prevent collecting, poaching, or indiscriminate killing. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S23. Direct foot traffic (trails) away from sensitive habitat features such as seeps, ravines, coves, etc. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

| Alabama Comprehensive Wildlife Conservation Strategy | ALTERNATIVES | | | | | | | | | | | | | | | |
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| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| Conservation Actions for Specific Terrestrial and Estuarine Habitats | | | | | | | | | | | | | | | | |
| Dry Hardwood Forest | | | | | | | | | | | | | | | | |
| CA1. Develop a coordinated plan with local and federal agencies with regard to acquisition of property or purchase of conservation easements to protect and promote large, unfragmented tracts (>1,000 acre) by protecting existing significant tracts. Work with Forest Legacy, Land Trusts, TNC and other partners. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA2. Avoid/discourage conversion to other forest types. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA3. Promote low-intensity controlled burns where ecological, safety, and property protection considerations allow. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA4. Control exotic plant and animal species. | + | - | + | + | + | - | + | + | + | - | + | + | + | - | + | + |
| CA5. Support full implementation of the USFS Revised Management Plan, PIF bird conservation plans, and all applicable USFWS species recovery plans and relevant recovery or management plans developed within the next ten years that promote conservation of these GCN species and their habitats. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA6. Encourage managers and landowners to favor mature and old-growth hardwood stands (because these are most often in shortest supply on a landscape scale). | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA7. Avoid or minimize plowed fire lines when possible; place fire lines where disturbance to sensitive natural groundcover can be avoided or minimized. Restore topography and natural vegetation where emergency plowed fire lines disrupt natural areas. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA8. Investigate effects of season and intensity of prescribed fire as a management technique. | - | - | + | + | - | - | + | + | - | - | + | + | - | - | + | + |

| Alabama Comprehensive Wildlife Conservation Strategy | ALTERNATIVES | | | | | | | | | | | | | | | |
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| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| CA9. Participate in the Alabama Prescribed Fire Council. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Mesic Hardwood Forest | | | | | | | | | | | | | | | | |
| CA1. Develop a coordinated plan with local and federal agencies with regard to acquisition of property or purchase of conservation easements to protect and promote large, unfragmented tracts (>1,000 acre) by protecting existing significant tracts. Work with Forest Legacy, Land Trusts, TNC and other partners. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA2. Avoid/discourage conversion to other forest types. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA3. Control exotic plant and animal species. | + | - | + | + | + | - | + | + | + | - | + | + | + | - | + | + |
| CA4. Support full implementation of the USFS Revised Management Plan, PIF bird conservation plans, and all applicable USFWS species recovery plans and relevant recovery or management plans developed within the next ten years that promote conservation of these GCN species and their habitats. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA5. Encourage managers and landowners to favor mature and old-growth hardwood stands (because these are most often in shortest supply on a landscape scale). | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Floodplain Forest | | | | | | | | | | | | | | | | |
| CA1. Develop a coordinated plan with local and federal agencies with regard to acquisition of property or purchase of conservation easements to protect existing significant tracts. Work with NAWCA, Forest Legacy, Land Trusts, TNC and other partners to protect significant blocks of high quality examples of this habitat. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |

| Alabama Comprehensive Wildlife Conservation Strategy | ALTERNATIVES | | | | | | | | | | | | | | | |
|--|--------------|---|---|---|----------|---|---|---|------------|---|---|---|-----------|---|---|---|
| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| CA2. Provide incentives and information to landowners for long-term conservation. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| CA3. Avoid/discourage conversion to agriculture or other forest types, and encourage restoration of altered habitats. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| CA4. Minimize, to the extent feasible, impacts of altered flood regimes. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| CA5. Control exotic plant and animal species. | + | - | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| CA6. Support full implementation of the USFS Revised Management Plan, PIF bird conservation plans, and all applicable USFWS species recovery plans and relevant recovery or management plans developed within the next ten years that promote conservation of these GCN species and their habitats. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| CA7. Encourage managers and landowners to favor mature and old-growth stands. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| CA8. Investigate effects of season and intensity of prescribed fire as a management technique. | - | - | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| Swamp | | | | | | | | | | | | | | | | |
| CA1. Develop a coordinated plan with local and federal agencies with regard to acquisition of property or purchase of conservation easements to protect existing significant tracts. Work with NAWCA, Forest Legacy, Land Trusts, TNC and other partners to protect significant blocks of high quality examples of this habitat. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| CA2. Provide incentives and information to landowners for long-term conservation. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| CA3. Avoid/discourage conversion to agriculture or other forest types, and encourage restoration of altered habitats. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |

| Alabama Comprehensive Wildlife Conservation Strategy | ALTERNATIVES | | | | | | | | | | | | | | | |
|--|--------------|---|---|---|----------|---|---|---|------------|---|---|---|-----------|---|---|---|
| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| CA4. Control exotic plant and animal species. | + | - | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| CA5. Support full implementation of the USFS Revised Management Plan, PIF bird conservation plans, and all applicable USFWS species recovery plans and relevant recovery or management plans developed within the next ten years that promote conservation of these GCN species and their habitats. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| CA6. Encourage managers and landowners to favor mature and old-growth stands. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| CA7. Investigate effects of season and intensity of prescribed fire as a management technique. | - | - | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| Glades and Prairies | | | | | | | | | | | | | | | | |
| CA1. Develop a coordinated plan with local and federal agencies with regard to acquisition of property or purchase of conservation easements to protect existing significant tracts. Promote large, unfragmented tracts by working with USFWS, TNC and other land conservation partners to identify, conserve and restore such tracts. | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |
| CA2. Encourage maintenance of grassland through prescribed burning. Acceptance of controlled burning can be enhanced through public education, programs to “fire-safe” properties, and cost-share programs to install fire lines and conduct controlled burns. | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |
| CA3. Coordinate and integrate existing initiatives and programs such as the Northern Bobwhite Conservation Initiative (NBCI) to influence habitat for birds and other wildlife by working with ADCNR, USFWS, and NRCS. | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |

| Alabama Comprehensive Wildlife Conservation Strategy | ALTERNATIVES | | | | | | | | | | | | | | | |
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| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| CA4. Support full implementation of the USFS Revised Management Plan, PIF bird conservation plans, and all applicable USFWS species recovery plans and relevant recovery or management plans developed within the next ten years that promote conservation of these GCN species and their habitats. | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |
| CA5. Avoid or minimize plowed fire lines when possible; place fire lines where disturbance to sensitive natural groundcover can be avoided or minimized. Restore topography and natural vegetation where emergency plowed fire lines disrupt natural areas. | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |
| CA6. Participate in the Alabama Prescribed Fire Council. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| CA7. Encourage thinning of overstocked pine forests by working with AFC. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| CA8. Discourage/avoid conversion of glades and barrens to mine sites and illegal garbage dump sites. Restore topography and natural vegetation where possible. | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |
| Caves and Mines | | | | | | | | | | | | | | | | |
| CA1. Acquire and protect, through proper gating and restricted usage, high-priority caves. Work with USFWS, TNC, National Speleological Society, Southeastern Cave Conservancy, American Cave Conservancy, Karst Waters Institute, and other partners to identify, conserve and restore such caves. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

| Alabama Comprehensive Wildlife Conservation Strategy | ALTERNATIVES | | | | | | | | | | | | | | | |
|---|--------------|---|---|---|----------|---|---|---|------------|---|---|---|-----------|---|---|---|
| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| CA2. Acquire or purchase conservation easements to protect surface habitats and watersheds of all caves supporting sensitive aquatic species such as Alabama cavefish and Tennessee Cave Salamander. Work with Forest Legacy and land trusts such as TNC, the Alabama Forest Resources Center, Alabama (Chattowah Open) Land Trust, and the Land Trust of Huntsville and North Alabama. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA3. Exclude all but legitimate scientific access to those caves serving as critical habitat to imperiled species. Work with landowners and cave groups such as National Speleological Society to restrict recreational caving to sites and seasons that will result in minimal impacts. | + | - | + | + | + | - | + | + | + | - | + | + | + | - | + | + |
| CA4. Identify recharge areas for ecologically significant caves (surface disturbance and pollution distant from cave entrances can impact cave fauna). NSS, AGS, NRCS, USFWS. | + | - | + | + | + | - | + | + | + | - | + | + | + | - | + | + |
| CA5. Encourage ecologically sensitive forestry practices on steep slopes around caves and sinks (AFA, AFC, NRCS). | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA6. Support full implementation of the USFS Revised Management Plan, PIF bird conservation plans, and all applicable USFWS species recovery plans and relevant recovery or management plans developed within the next ten years that promote conservation of these GCN species and their habitats. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA7. Educate cave visitors who may unintentionally disturb bats and other cave-dwelling species. Partner with the National Speleological Society and the American Cave Conservancy. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

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|---|--------------|---|---|---|----------|---|---|---|------------|---|---|---|-----------|---|---|---|
| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| CA8. Support/promote efforts to reduce persistent pesticides in the surface groundwater recharge area by working with USFWS, NRCS, and local partners. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA9. Where absent, restore forested buffers around cave entrances to provide dispersal/foraging habitat for some species while improving water and air quality and temperature regimes. Partner with AFC and USFS among others. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Isolated Wetland | | | | | | | | | | | | | | | | |
| CA1. Develop a coordinated plan with local and federal agencies with regard to acquisition of property or purchase of conservation easements to protect existing significant wetlands. Protect high-quality forest tracts that contain isolated wetlands. Work with Longleaf Alliance, USFWS, TNC and other partners. | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |
| CA2. Ensure that isolated wetlands on all publicly owned lands are fully protected from sedimentation, draining, and destruction. Partners include ADCNR-SLD, AFC, USFWS, USFS, and DoD. | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |
| CA3. Remove fish from and/or prevent stocking of fish in, natural isolated ponds on public lands, and encourage private landowners to maintain some fishless ponds. Work with NRCS and USFS, whose 2004 Land and Resource Management Plan states, "Do not introduce fish into seasonal or sinkhole ponds." | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |

| Alabama Comprehensive Wildlife Conservation Strategy | ALTERNATIVES | | | | | | | | | | | | | | | |
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| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| CA4. Support full implementation of the USFS Revised Management Plan, PIF bird conservation plans, and all applicable USFWS species recovery plans and relevant recovery or management plans developed within the next ten years that promote conservation of these GCN species and their habitats. | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |
| CA5. Work with large industrial timberland owners to encourage identification and protection of significant wetlands and adjacent uplands. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| CA6. Avoid placing emergency plowed fire lines through dry wetlands when possible; restore topography and natural vegetation where emergency plowed fire lines disrupt wetland basins. | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |
| CA7. Participate in the Alabama Prescribed Fire Council. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| CA8. Develop educational materials to inform the public of the importance of ephemeral wetlands. Work with Legacy, AFC, TNC, PARC, PIF, and others. | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |
| CA9. Create artificial wetlands where wetlands have been lost. Partner with NRCS, USFS, USFWS, PARC. | + | + | + | + | + | + | + | + | N | N | N | N | N | N | N | N |
| Artificial Habitats | | | | | | | | | | | | | | | | |
| CA1. American Kestrel/Southeastern American Kestrel: Implement a nest box program in partnership with AOS, SABA. Agricultural lands afford excellent foraging, but cavities are limited. | + | + | + | + | + | + | + | + | + | + | + | + | N | N | N | N |
| CA2. Gopher Tortoise: Map current distribution on transmission line rights-of-way in partnership with major utilities including Alabama Power Company, ConocoPhillips, and others. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |

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| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| CA3. Support full implementation of the USFS Revised Management Plan, PIF bird conservation plans, and all applicable USFWS species recovery plans and relevant recovery or management plans developed within the next ten years that promote conservation of these GCN species and their habitats. | + | + | + | + | + | + | + | + | + | + | + | + | N | N | N | N |
| CA4. Encourage land managers to protect and buffer any remaining natural areas. These are the areas where most GCN taxa will persist, or visit. | + | + | + | + | + | + | + | + | + | + | + | + | N | N | N | N |
| CA5. Encourage land managers to develop naturally vegetated corridors between habitat fragments. | + | + | + | + | + | + | + | + | + | + | + | + | N | N | N | N |
| CA6. Encourage golf courses and other large land managers to adopt integrated pest management strategies to reduce chemical use. | + | + | + | + | + | + | + | + | + | + | + | + | N | N | N | N |
| CA7. Encourage land managers to consider restoring natural hydrology to drained wetlands. | + | + | + | + | + | + | + | + | + | + | + | + | N | N | N | N |
| CA8. Encourage land managers to avoid mowing wetlands, shorelines, and ditches mid-spring through mid-fall. This period is usually a critical time of reproduction and rearing of young for most vertebrate taxa. | + | + | + | + | + | + | + | + | + | + | + | + | N | N | N | N |
| CA9. Encourage land managers to avoid overgrazing and keep livestock out of wetlands. | + | + | + | + | + | + | + | + | + | + | + | + | N | N | N | N |
| CA10. Control/eradicate exotic plants and animals. | + | - | + | + | + | - | + | + | + | - | + | + | + | - | + | + |
| CA11. Preserve older farm buildings for wildlife use. Partner with historic preservation organizations and land trusts. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Cliffs and Rockhouses | | | | | | | | | | | | | | | | |
| CA1. Protect best examples of this habitat through acquisition or easement. Work with USFWS, TNC and other land conservation partners. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

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| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| CA2. Discourage residential development of bluff lines. Work with local governments to promote restrictive zoning, or to purchase scenic easements, as has been done in other parts of the country. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA3. Support full implementation of the USFS Revised Management Plan, PIF bird conservation plans, and all applicable USFWS species recovery plans and relevant recovery or management plans developed within the next ten years that promote conservation of these GCN species and their habitats. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA4. Discourage destruction of cliff vegetation by recreational users. Work with USFS, NPS, and other land managing partners to educate the public of the fragility and significance of these habitats. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Statewide Conservation Actions — Rivers and Streams | | | | | | | | | | | | | | | | |
| Aquatic GCN Species | | | | | | | | | | | | | | | | |
| S24. Protect remaining free-flowing rivers and streams from impoundment. | + | + | + | + | N | N | N | N | N | N | N | N | + | + | + | + |
| S25. Minimize activities that alter flow or temperature regimes in large streams and rivers. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S26. Operate existing dams and other water use facilities to minimize direct impacts to aquatic fauna. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| S27. Exclude point-source (industrial, municipal, agricultural) and nonpoint-source (residential, silvicultural, agricultural) pollution from waterways. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S28. Avoid the introduction of non-native aquatic species. | + | + | + | + | N | N | N | N | + | + | + | + | + | + | + | + |

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| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| S29. Allow natural movement of sand and gravel: retain sand and gravel bar-related processes by avoiding in-stream mineral extraction, vehicular traffic, and other disruptions to streambeds. | + | + | + | + | N | N | N | N | + | + | + | + | + | + | + | + |
| S30. Allow the natural development and movement of woody and rocky structure. Avoid desnagging. | + | + | + | + | N | N | N | N | + | + | + | + | + | + | + | + |
| S31. Allow, or where impaired, restore the unimpeded development of native streambank vegetational composition and structure. | - | - | - | - | N | N | N | N | + | + | + | + | + | + | + | + |
| S32. Allow, or where impaired, restore the unimpeded development of natural processes such as bank dynamics, channel meanders, and flood regimes. | - | - | - | - | N | N | N | N | + | + | + | + | + | + | + | + |
| S33. Minimize use of fertilizers, herbicides, and pesticides near rivers. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S34. Limit excessive harvest and indiscriminant killing of amphibian and reptile species. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| S35. Dispose of dredge spoil to benefit nesting turtles. | + | + | + | + | N | N | N | N | + | + | + | + | N | N | N | N |
| S36. Provide conservation-related educational materials to boaters, fishermen, and other recreational users of Alabama's rivers and streams. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

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|--|--------------|---|---|---|----------|---|---|---|------------|---|---|---|-----------|---|---|---|
| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| Conservation Actions for Specific River Basins of Alabama | | | | | | | | | | | | | | | | |
| Tennessee River Basin | | | | | | | | | | | | | | | | |
| All GCN Species | | | | | | | | | | | | | | | | |
| CA1. Support full implementation of the Tennessee Rivers Basin Management Plan, including all existing Tennessee drainage species recovery plans and relevant recovery or management plans developed within the next ten years that promote conservation of these GCN species and their habitats. | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| CA2. Support implementation of more natural flow regimes and full compliance with water quality standards by TVA at Tennessee River, Elk River and Bear Creek watershed dams. In particular, the tailwaters of Wilson and Guntersville Dams are critical to the recovery of more GCN species than any other site in Alabama. | + | + | + | + | N | N | N | N | N | N | N | N | + | + | + | + |
| CA3. Improve water quality and habitat quality throughout the basin. Support habitat and riparian restoration where needed by TVA, ADEM, local governments, Clean Water Partnership and other partners. | + | + | + | + | N | N | N | N | + | + | + | + | + | + | + | + |
| CA4. Support expansion of the Wheeler National Wildlife Refuge to include lower reaches of Limestone and Piney creeks, by working with the USFWS, Forever Wild, TNC and other partners. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |

| Alabama Comprehensive Wildlife Conservation Strategy | ALTERNATIVES | | | | | | | | | | | | | | | |
|---|--------------|---|---|---|----------|---|---|---|------------|---|---|---|-----------|---|---|---|
| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| Mussels | | | | | | | | | | | | | | | | |
| CA5. Most GCN species may require population augmentation and/or reintroduction to suitable habitats to maintain their viability. The most critical sites for the conservation of mussels in the Tennessee basin are the tailwaters of Wilson and Guntersville Dams, the Paint Rock River and Bear Creek. The genetic integrity of populations among drainages should be maintained. This work should be a cooperative effort of ARRC, TNARI, USFWS and other partners. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| Snails | | | | | | | | | | | | | | | | |
| CA6. Most GCN species may require population augmentation and/or reintroduction to suitable habitats to maintain their viability. The most critical sites for the conservation of snails in the basin are the tailwaters of the Tennessee River Dams. The genetic integrity of populations among drainages should be maintained. This work should be a cooperative effort of ARRC, TNARI, USFWS and other partners. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |
| Crayfishes | | | | | | | | | | | | | | | | |
| CA7. All GCN species -Interbasin transfer of crayfishes should be avoided under all circumstances because non-native species can rapidly increase in population and aggressively displace native species. | + | + | + | + | N | N | N | N | N | N | N | N | N | N | N | N |

| Alabama Comprehensive Wildlife Conservation Strategy | ALTERNATIVES | | | | | | | | | | | | | | | |
|---|--------------|---|---|---|----------|---|---|---|------------|---|---|---|-----------|---|---|---|
| | Wheeler | | | | Key Cave | | | | Sauta Cave | | | | Fern Cave | | | |
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| Fishes | | | | | | | | | | | | | | | | |
| CA8. Ashy Darter, Elegant Madtom, Blotchside Logperch, Palezone Shiner, Boulder Darter, Lollipop Darter, Snail Darter, Bluebreast Darter, Slackwater Darter, Slenderhead Darter, Bandfin Darter, Blueface Darter, Gilt Darter – These species may require population augmentation and/or reintroduction to suitable habitats to maintain their viability. This work should be a cooperative effort of ARRC, TARI, USFWS and other partners. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| CA9. Boulder Darter - The Elk River from Gallus Island upstream to the Tennessee-Alabama state line should be designated as critical habitat for this endangered species. This designation would also assist the recovery of other Elk River GCN species. | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |

Appendix N. Finding of No Significant Impact

INTRODUCTION

The U.S. Fish and Wildlife Service proposes to protect and manage certain fish and wildlife resources in Jackson, Lauderdale, Limestone, Madison, and Morgan Counties, Alabama, through the Wheeler National Wildlife Refuge (NWR) Complex. An Environmental Assessment (EA) has been prepared to inform the public of the possible environmental consequences of implementing the Comprehensive Conservation Plan (CCP) for Wheeler NWR Complex. A description of the alternatives, the rationale for selecting the preferred alternative, the environmental effects of the preferred alternative, the potential adverse effects of the action, and a declaration concerning the factors determining the significance of effects, in compliance with the National Environmental Policy Act of 1969, are outlined below. The supporting information can be found in the EA, Section B of the Draft CCP.

ALTERNATIVES

In developing the Comprehensive Conservation Plan for Wheeler NWR Complex, the Fish and Wildlife Service evaluated four alternatives (A, B, C, and D). The Service adopted Alternative D, the "Preferred Alternative," as the comprehensive conservation plan for guiding the direction of the Refuge Complex for the next 15 years. The overriding concern reflected in this plan is that wildlife conservation assumes first priority in refuge management; wildlife-dependant recreational uses are allowed if they are compatible with wildlife conservation. Wildlife dependent recreation uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) will be emphasized and encouraged.

ALTERNATIVE A (NO ACTION ALTERNATIVE)

Alternative A represents no change from current management of Wheeler NWR Complex. Under this alternative, all management actions would be directed towards achieving the Complex's primary purpose(s), including (1) conserving wintering waterfowl habitat; (2) meeting the habitat conservation goals of national and international plans; and (3) and conserving wetlands, all while contributing to other national, regional, and state goals to protect and restore migratory birds, threatened and endangered species, and resident species. Hunting and fishing would continue to be major focuses of the public use program, with no expansion of current opportunities and current restrictions or prohibitions would remain intact. Environmental education and interpretation, wildlife observation and photography would remain at present levels.

ALTERNATIVE B

Alternative B would provide for more public use recreational opportunities, while maintaining current habitat and wildlife management programs. Most habitat management programs would continue. However, habitat improvement projects that would benefit compatible wildlife-dependent public use opportunities would be given a higher priority. At Wheeler NWR, the number of hunting days for small game would be increased within the state hunting season framework and two additional youth fishing rodeos would be held annually. The 2,000-acre area surrounding Garth Slough, presently closed to all public entry from November 15 - January 15, would be evaluated for the possibility of opening select portions of the upland areas to public access. In addition, the hunting of feral hogs would be allowed during both the large game and small game seasons. At Key Cave NWR, feral hogs would be added to the hunting permit and other hunting opportunities would be explored annually.

Increased wildlife observation and photography opportunities would result from the construction of nine new visitor facilities at Wheeler NWR (three photo blinds, three wildlife observation towers, a wildlife viewing platform, a nature trail, and a wildlife drive). Environmental education and interpretation would be expanded by increasing the number of off-refuge programs and by constructing a new environmental education center at Wheeler NWR. New informational brochures would be published for Key Cave, Sauta Cave, and Fern Cave NWRs and visitor access would be improved at Sauta Cave NWR.

ALTERNATIVE C

The primary focus under Alternative C would maximize wildlife and habitat management while maintaining current public use opportunities. At each refuge in the Complex, extensive wildlife, plant, and habitat inventories would be initiated. Studies necessary to reduce impacts of contaminants to fish, wildlife, and plants would be initiated and a Complex-wide litter control program would be developed and implemented. Conservation efforts would increase for threatened and endangered species and nuisance animal species control would be increased.

Any areas within the Complex with pumping and water control capabilities would be managed for moist-soil vegetation, or farmed (with 100 percent of crops left standing) to benefit migratory waterfowl. Cooperative farming would be eliminated and all farming activities would be conducted via contracts or force account (using Complex staff and equipment). Law enforcement (LE) activities to protect trust resources would be intensified and a study to analyze the impacts of existing rights-of-way on refuge resources would be initiated. Results would determine if current Complex policy concerning easements should be altered and coordination with local planning departments would be increased. Land acquisition at Fern Cave NWR would remain focused on acquiring land surrounding the fifth cave entrance (Surprise Pit). Land protection within the lower reaches of Piney and Limestone Creeks and lands within the Key Cave high risk water recharge zone would be explored.

Compatible wildlife-dependent recreation activities would continue as currently scheduled, but only where and when they did not detract from, or conflict with, wildlife management activities and objectives. All Complex lands would be closed at night to the public and select areas of high waterfowl use on Wheeler NWR would be closed from November 1 – March 1, reducing acreages for public use and eliminating all night bank fishing.

ALTERNATIVE D (PROPOSED ACTION)

The preferred alternative, Alternative D, is considered to be the most effective management action for meeting the purposes of the Wheeler NWR Complex. Under Alternative D, cooperative farming would continue and areas with water control capabilities would be managed for moist-soil vegetation or would be force-account farmed (with 100 percent of crops left standing) to benefit migratory waterfowl. Nuisance animal species control would be increased and studies necessary to reduce impacts of contaminants to fish, wildlife, and plants would be developed. A Complex-wide litter control program would be initiated and conservation efforts increased for threatened and endangered species.

A large majority of Complex lands would be closed at night and select areas of high waterfowl use on Wheeler NWR would be closed from November 1 – March 1, slightly reducing acreages for public use. However, all six improved boat launching facilities and several other designated night bank fishing areas would remain open at night. A night fishing permit would be required.

Resource protection and visitor safety would be increased with additional LE activities and a study to analyze the impacts of existing rights-of-way on resources would be initiated. Results would determine if current Complex policy concerning easements should be altered. Coordination with local planning departments would be increased and the priority of land acquisition at Fern Cave NWR would remain focused on acquiring land surrounding the fifth cave entrance (Surprise Pit). Land protection within the lower reaches of Piney and Limestone Creeks and lands within the Key Cave high risk water recharge zone would be explored.

At Wheeler NWR, the number of hunting days for small game would be increased within the state hunting season framework and an additional youth fishing rodeo would be held annually. Feral hogs would be hunted during both the large game and small game seasons. At Key Cave NWR, the hunting program would be evaluated annually and results would dictate if hunting should be expanded, reduced, or remain the same.

Increased wildlife observation and photography opportunities would result from the construction of four new visitor facilities at Wheeler NWR (a photo blind, a wildlife observation tower, a wildlife viewing platform, and a wildlife drive). Environmental education and interpretation would be expanded by increasing the number of off-refuge programs and by constructing an environmental education center at Wheeler. New informational brochures would be published for Key Cave, Sauta Cave, and Fern Cave NWRs and visitor access would be improved at Sauta Cave NWR.

SELECTION RATIONALE

Alternative D is selected for implementation because it directs the development of programs to best achieve the purpose and goals of each refuge in the Complex and emphasizes a balanced approach for addressing key issues and refuge mandates, while improving wildlife and habitat management. It is designed to optimize habitat management, while providing a balance of appropriate and compatible wildlife-dependent recreational and educational programs for visitors; collects habitat and wildlife data; and ensures long term achievement of Refuge and Service objectives. At the same time, these management actions provide balanced levels of compatible public use opportunities consistent with existing laws, Service policies, and sound biological principles. It provides the best mix of program elements to achieve desired long term conditions.

Under this alternative, all lands under the management and direction of the Complex will be protected, maintained, and enhanced to best achieve national, ecosystem, and refuge specific goals and objectives within anticipated funding and staffing levels. In addition, the proposed action positively addresses significant issues and concerns expressed by the public.

ENVIRONMENTAL EFFECTS

Implementation of the Service's management action is expected to result in environmental, social, and economic effects as outlined in the CCP. Habitat management, population management, land conservation, and visitor service management activities on Wheeler NWR Complex would result in increased migratory bird utilization and production; increased protection for threatened and endangered species; enhanced wildlife populations; bottomland hardwood forest and native warm season grassland restoration; and enhanced opportunities for wildlife dependent recreation and environmental education. These effects are detailed as follows:

1. Waterfowl and shorebird use of Wheeler NWR would improve significantly as intensive water management efforts would provide dependable flooded habitats to match the migration chronologies of these species. Population numbers and habitat use would be monitored and managed.

2. Migratory bird production would increase by enhancing forest habitat quality for neotropical migratory birds, habitat and food availability for wintering waterfowl, and through hydrological restoration and reforestation. Forest management practices such as reforestation, selective harvests, and preservation of mature stand components would benefit nesting and feeding habitat for neotropical migratory birds and forest breeding birds.

3. Land acquisition and protection at Fern Cave NWR would benefit the recovery of threatened and endangered species. Gray bat, Indiana bat, and Alabama cavefish recovery efforts would be fully supported with Complex staff and resources.

4. The Complex's habitat mix of cropland, early successional reforestation areas, and bottomland hardwood forest, as well as areas under habitat management, would improve food and cover for resident wildlife species and enhance wetland communities.

5. Habitat restoration and management, along with a focus on accessibility and facility developments, would result in improved compatible wildlife dependent recreational opportunities. While public use would result in some minimal, short term adverse effects on wildlife, and user conflicts may occur at certain times of the year, these effects are minimized by site design, time zoning, and implementing refuge regulations. Anticipated long term impacts to wildlife and wildlife habitats of implementing the management action are positive. In the long run, wildlife habitat and increased opportunities for wildlife dependent recreation opportunities could result in an increase in economic benefits to the local community.

6. Implementing the CCP is not expected to have any significant adverse effects on wetlands and floodplains, pursuant to Executive Orders 11990 and 11988, as actions would not result in development of buildings and/or structures within floodplain areas, nor would they result in irrevocable, long term adverse impacts. In fact, a major thrust of the management action is to implement bottomland hardwood forest, native warm season grass and open wetland restoration within the wildlife communities of each refuge. Implementing the management action would result in substantial enhancement of forest, grassland, and open wetland communities and net increases to the Nation's bottomland hardwood forest, grassland, and open wetland acreage and quality.

POTENTIAL ADVERSE EFFECTS AND MITIGATION MEASURES

WILDLIFE DISTURBANCE

Disturbance to wildlife at some level is an unavoidable consequence of any public use program, regardless of the activity involved. Obviously, some activities innately have the potential to be more disturbing than others. The management actions to be implemented have been carefully planned to avoid unacceptable levels of impact. As currently proposed, the known and anticipated levels of disturbance of the management action are considered minimal and well within the tolerance level of known wildlife species and populations present in the area. Implementation of the public use program would take place through carefully controlled time and space zoning, establishment of protection zones around key sites, closures of all-terrain vehicle trails, and routing of roads and trails to avoid direct contact with sensitive areas, such as nesting bird habitat, etc.

All hunting activities (season lengths, bag limits, number of hunters) would be conducted within the constraints of sound biological principles and refuge-specific regulations established to restrict illegal or non-conforming activities. Monitoring activities through wildlife inventories and assessments of public use levels and activities would be utilized, and public use programs would be adjusted as needed to limit disturbance.

USER GROUP CONFLICTS

As public use levels expand across time, some conflicts between user groups may occur. Programs would be adjusted, as needed, to eliminate or minimize these problems and provide quality wildlife-dependent recreational opportunities. Experience has proven that time and space zonings, such as establishment of separate use areas, use periods, and restricting numbers of users, are effective tools in eliminating conflicts between user groups.

EFFECTS ON ADJACENT LANDOWNERS

Implementation of the management action would not impact adjacent landowners. Essential access to private property would be allowed through issuance of special use permits. Future land acquisition would occur on a willing-seller basis only, at fair market values within the approved acquisition boundary. Lands are acquired through a combination of fee title purchases and/or donations and less-than-fee title interests (e.g., conservation easements, cooperative agreements) from willing sellers. Funds for the acquisition of lands within the approved acquisition boundary would likely come from the Land and Water Conservation Fund or the Migratory Bird Conservation Act.

LAND OWNERSHIP AND SITE DEVELOPMENT

Proposed acquisition efforts by the Service would result in changes in land and recreational use patterns, since all uses on national wildlife refuges must meet compatibility standards. Land ownership by the Service also precludes any future economic development by the private sector. Potential development of access roads, dikes, control structures, and visitor parking areas could lead to minor short-term negative impacts on plants, soil, and some wildlife species. When site development activities are proposed, each activity will be given the appropriate National Environmental Policy Act consideration during pre-construction planning. At that time, any required mitigation activities will be incorporated into the specific project to reduce the level of impacts to the human environment and to protect fish and wildlife and their habitats.

As indicated earlier, one of the direct effects of site development is increased public use; this increased use may lead to littering, noise, and vehicle traffic. While funding and personnel resources will be allocated to minimize these effects, such allocations make these resources unavailable for other programs.

The management action is not expected to have significant adverse effects on wetlands and floodplains, pursuant to Executive Orders 11990 and 11988.

COORDINATION

This management action has been thoroughly coordinated with all interested and/or affected parties. Parties contacted include:

All affected landowners and interested citizens
Congressional representatives and local community officials
Governor of Alabama
Alabama Department of Conservation and Natural Resources (ADCNR)
Alabama State Historic Preservation Officer (ASHPO)
Tennessee Valley Authority (TVA)
Redstone Arsenal Military Base
Conservation organizations

FINDINGS

It is my determination that the management action does not constitute a major federal action significantly affecting the quality of the human environment under the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969 (as amended). As such, an environmental impact statement is not required. This determination is based on the following factors (40 C.F.R. 1508.27), as addressed in the EA for the Wheeler NWR Complex:

1. Both beneficial and adverse effects have been considered and this action will not have a significant effect on the human environment. (Environmental Assessment, pages 183-203).
2. The actions will not have a significant effect on public health and safety. (Environmental Assessment, page 185).
3. The project will not significantly affect any unique characteristics of the geographic area such as proximity to historical or cultural resources, wild and scenic rivers, or ecologically critical areas. (Environmental Assessment, pages 186-187).
4. The effects on the quality of the human environment are not likely to be highly controversial. (Environmental Assessment, page 183, page 185, and page 202).
5. The actions do not involve highly uncertain, unique, or unknown environmental risks to the human environment. (Environmental Assessment, page 183, page 185, and page 202).
6. The actions will not establish a precedent for future actions with significant effects nor do they represent a decision in principle about a future consideration. (Environmental Assessment, pages 183-203).
7. There will be no cumulatively significant impacts on the environment. Cumulative impacts have been analyzed with consideration of other similar activities on adjacent lands, in past action, and in foreseeable future actions. (Environmental Assessment, page 202).
8. The actions will not significantly affect any site listed in, or eligible for listing in, the National Register of Historic Places, nor will they cause loss or destruction of significant scientific, cultural, or historic resources. (Environmental Assessment, pages 184-185).
9. The actions are not likely to adversely affect threatened or endangered species, or their habitats. (Environmental Assessment, pages 186-187 and pages 287-292).
10. The actions will not lead to a violation of federal, state, or local laws imposed for the protection of the environment. (Environmental Assessment, pages 183-186).

SUPPORTING REFERENCES

U.S. Fish and Wildlife Service. 2007. *Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler National Wildlife Refuge Complex, Jackson, Lauderdale, Limestone, Madison, and Morgan Counties, Alabama*. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region.

DOCUMENT AVAILABILITY

The Draft Environmental Assessment is located in Section B of the Draft Comprehensive Conservation Plan for the Wheeler NWR Complex and was made available in April 2007. The Final EA is located in Section B of this document. Additional copies are available by writing: Wheeler NWR Complex, 2700 Refuge Headquarters Road, Decatur, Alabama 35603.

ACTING  **II S II**

Sam D. Hamilton
Regional Director

7-19-07

Date