
Watercress Darter National Wildlife Refuge

Comprehensive Conservation Plan



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

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COMPREHENSIVE CONSERVATION PLAN

WATERCRESS DARTER NATIONAL WILDLIFE REFUGE
Jefferson County, Alabama

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

Southeast Region
Atlanta, Georgia

October 2010

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I. Background

INTRODUCTION

This Comprehensive Conservation Plan (CCP) for Watercress Darter National Wildlife Refuge (NWR), in Jefferson County, Alabama, (Figure 1) was prepared to guide management actions and direction for the refuge. Fish and wildlife conservation will receive first priority in refuge management; wildlife-dependent recreation will be allowed and encouraged as long as it is compatible with, and does not detract from, the mission of the refuge or the purposes for which it was established.

A planning team developed a range of alternatives that best met the goals and objectives of the refuge and that could be implemented within the 15-year planning period. This CCP describes the Fish and Wildlife Service's plan. The CCP, in draft format, was made available to state and federal government agencies, non-governmental organizations, conservation partners, and the general public for review and comment. Comments from each entity were considered in the development of this CCP.

PURPOSE AND NEED FOR THE PLAN

The purpose of the CCP is to provide refuge managers with a plan of action to achieve the refuge purpose; to attain the vision and goals developed for the refuge; to contribute to National Wildlife Refuge System (Refuge System) mission; to address key problems, issues, and relevant mandates; and one that is consistent with sound principles of fish and wildlife management.

Specifically, the plan is needed to:

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

U.S. FISH AND WILDLIFE SERVICE

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

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

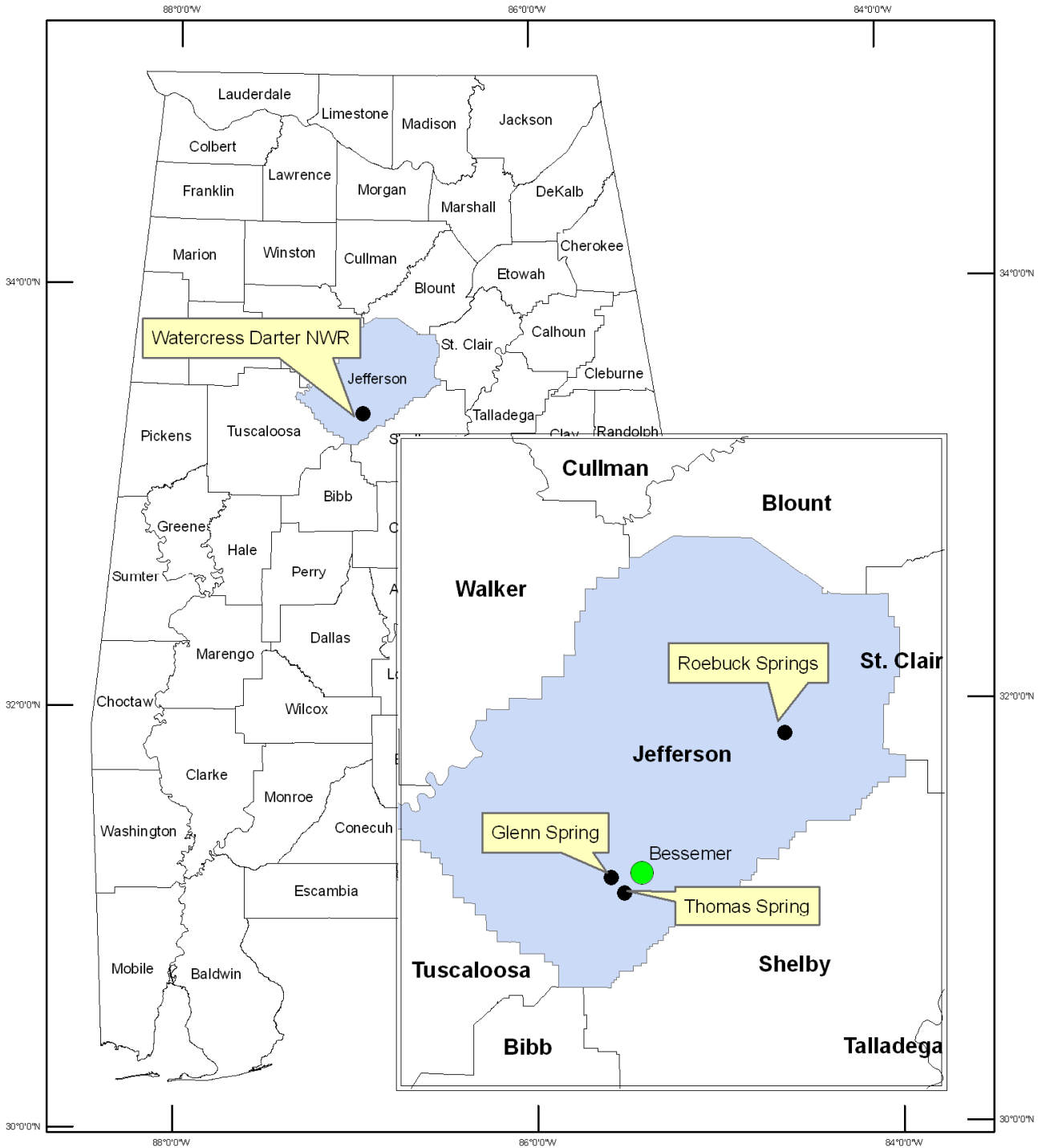
Figure 1. General location of Watercress Darter NWR



U.S. Fish & Wildlife Service

Watercress Darter National Wildlife Refuge
Jefferson County, Alabama

Central Gulf Coast Ecoregion



PRODUCED BY WHEELER NWR COMPLEX
DECATUR, ALABAMA
MAP DATE: 4/17/07



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

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

NATIONAL WILDLIFE REFUGE SYSTEM

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

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

The National Wildlife Refuge System Improvement Act of 1997 (Improvement Act) established, for the first time, a clear legislative mission of wildlife conservation for the 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 by establishing natural resources and recreation/education programs. Consistent with the Improvement Act, approved plans will serve as the guidelines for refuge management for the next 15 years. The Improvement Act states that each refuge shall be managed to:

- Fulfill the mission of the Refuge System;
- Fulfill the individual purposes of each refuge;
- Consider the needs of wildlife first;
- Fulfill requirements of comprehensive conservation plans that are prepared for each unit of the Refuge System;
- Maintain the biological integrity, diversity, and environmental health of the Refuge System;
- and

-
- Recognize that wildlife-dependent recreation activities including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are legitimate and priority public uses; and allow refuge managers authority to determine compatible public uses.

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

National wildlife refuges connect visitors to their natural resources heritage and provide them with an understanding and appreciation of fish and wildlife ecology to help them understand their role in the environment. Wildlife-dependent recreation on refuges also generates economic benefits to local communities. According to the report, *Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation*, approximately 34.8 million people visited national wildlife refuges in Fiscal Year 2006, generating almost \$1.7 billion in total economic activity and creating almost 27,000 private sector jobs producing about \$542.8 million in employment income (Carver and Caudill 2007). Additionally, recreational spending on refuges generated nearly \$185.3 million in tax revenue at the local, county, state, and federal levels (Carver and Caudill 2007). As the number of visitors grows, significant economic benefits are realized by local communities. In 2006, nearly 71 million people, 16 years and older, fished, hunted, or observed wildlife, spending \$45.7 billion and generating \$122.6 billion (Leonard 2008).

Volunteers continue to be a major contributor to the success of the Refuge System. In 2005, approximately 38,000 refuge volunteers donated more than 1.4 million hours. The value of their service was more than \$25 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 lands 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 purposes. The CCP will be consistent with sound resource management principles, practices, and legal mandates, including Service compatibility standards and other policies, guidelines, and planning documents (602 FW 1.1).

LEGAL AND POLICY CONTEXT

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

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

Treaties, laws, administrative guidelines, and policy guidelines assist the refuge manager in making decisions pertaining to soil, water, air, flora, fauna, and other natural resources; historical and cultural resources, research and recreation on refuge lands, and provide a framework for cooperation between Watercress Darter NWR and other partners, such as the Alabama Department of Conservation and Natural Resources (ADCNR) and its Division of Wildlife and Fresh Water Fisheries (DWFF), The Nature Conservancy (TNC), Birmingham Audubon Society (BAS), Alabama Natural Heritage Program (ANHP), Natural Resources Conservation Service (NRCS), Wildlife Habitat Council, and private landowners, etc.

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

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

The 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, managers will use sound professional judgment to determine their refuges' contribution 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.

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 the following:

Partners in Flight Initiative. Growing concern about declines in many land bird species not covered by existing conservation initiatives, primarily non-game species, led to the launching of Partners in Flight in 1990. The Partners in Flight Initiative is an international, cooperative effort of government agencies, philanthropies, professional organizations, conservation groups, industry, academics, and private individuals. Its initial focus was on neotropical migratory birds – species that breed in North America and winter in Central and South America – but its emphasis has now expanded to encompass most land birds and other species requiring terrestrial habitats. The Partners in Flight Initiative has a number of programs underway, including a North American Landbird Conservation Plan. 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. The Partners in Flight Initiative's main premise is that the resources of public and private entities in the Americas, both North and South, must be combined, coordinated, and increased if success in conserving hemispheric bird populations is to be achieved (Rich et al. 2004).

Watercress Darter Recovery Plan. Recovery plans delineate reasonable actions which are believed to be required to recover and/or protect the listed species. Plans are prepared by the Service, sometimes with the assistance of recovery teams, contractors, state agencies, and others. Objectives will only be attained and funds expended contingent upon appropriations, priorities, and other budgetary constraints. Recovery plans do not necessarily represent the views nor the official positions or approvals of any individuals or agencies, other than the Service, involved in the plan formulation. They represent the official position of the Service only after they have been signed by the Regional Director or Director as approved. Approved recovery plans are subject to modification as dictated by new findings, changes in species status, and the completion of recovery tasks.

The watercress darter is an endangered species known to occur naturally in habitat associated with four springs in Jefferson County, Alabama: Glenn, Thomas, Seven, and Roebuck. The watercress darter also occurs in Tapawingo Springs, Jefferson County, Alabama, where it was successfully transplanted in January 1988.

Within Roebuck Springs, the watercress darter occurs in approximately 2 acres of spring pool and 3,000 feet of spring run. At Tapawingo Springs, the watercress darter occurs in approximately 2 acres of spring pools and wetlands and 600 feet of spring run. At Glenn Springs, the watercress darter occurs in approximately 0.1-acre of spring pool and 1,800 feet of both the spring run and parts of Halls Creek. At Thomas Spring, the watercress darter occurs in approximately 2 acres of spring pools and 1,000 feet of spring run. At Seven Springs, the watercress darter occurs in approximately 0.2-acre of spring pool and 1,500 feet of spring run and it has also been found in Nabors Creek, below Seven Springs run, between 31 Street and Jefferson Avenue.

Limited population survey results from the 1980s and 1990s indicated an apparent downward trend for the three naturally occurring populations that were known to exist at that time (USFWS 1993). Currently, the habitat and the spring ecosystem conditions of the watercress darter continue to decrease in all five spring sites (USFWS 2009), particularly within the recharge areas necessary for the spring's groundwater and outflow (D. Drennen, pers. obs.). Changes in quality and quantity of groundwater from the recharge area in all the spring sites are associated with the poor use of best management practices for urbanization, stormwater management, and sedimentation, which impacts watersheds on adjoining non-protected lands that drain the immediate areas and impacts aquifer recharge areas on a larger scale.

Recovery objectives, according to the 1992 recovery plan for the watercress darter, are as follows:

- Reclassify the watercress darter from endangered to threatened status;
- Delist;

Recovery Criteria: The criteria for reclassification of the watercress darter from endangered status to threatened are:

- Long-term protection of the three naturally occurring populations known in 1992 (i.e., those found in Glenn, Thomas, Seven, and Roebuck Springs);
- Long-term protection of at least one additional population within the historical range (i.e., the Jefferson County area); and
- Five (5) years of data indicating that a minimum of four populations are viable.

The criteria for delisting the watercress darter from threatened status are:

- Five (5) years of data documenting the existence of six viable populations, each in separate discrete recharge areas; and
- Long-term protection of the discrete recharge area for each viable population.

Partners for Amphibians and Reptiles Conservation. The Partners for Amphibians and Reptiles Conservation was founded in 1998 to address the need for conservation of herpetofauna – amphibians and reptiles – and their habitats (Olson et al. 2009). 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. The first organizational meeting of this group was attended by more than 200 individuals from over 170 organizations and agencies, including representatives from federal and state agencies, conservation organizations, museums, nature centers, universities, research laboratories, the forest products industry, the pet trade industry, and environmental consultants and contractors, including participants from 33 states, the District of Columbia, and Canada and Mexico.

The refuge will contribute to the following goals of the Partners for Amphibians and Reptiles Conservation:

- Complete a baseline study of refuge amphibian and reptile populations;
- Maintain quality of the springs and ponds (e.g., water quality);

RELATIONSHIP TO STATE WILDLIFE AGENCY

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

The Alabama Department of Conservation and Natural Resources (ADCNR) manages and protects the state's fish and wildlife resources through conservation enforcement officers in each county statewide and through fisheries and wildlife biologists (ADCNR 2004). The ADCNR manages 24 state parks, 23 fishing lakes, 3 fish hatcheries, 2 waterfowl refuges, 2 wildlife sanctuaries, a mariculture center, and 34 wildlife management areas. The agency has responsibility for more than 645,000 acres of trust lands set aside for wildlife purposes. Additionally, the ADCNR provides and directs public recreation opportunities, including an extensive hunting and fishing program on several wildlife management areas and parks located near the refuge. Other departmental functions include maintenance of a State Land Resource Information Center and administration of the Forever Wild land acquisition program.

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

II. Refuge Overview

INTRODUCTION

The watercress darter (*Etheostoma nuchale*) is endemic to four limestone springs of the Valley and Ridge Physiographic Province in the Black Warrior River System (Figure 2) in Jefferson County, Alabama (Boschung and Mayden 2004). Three of the springs where the species naturally occurs (Glenn, Thomas, and Seven) are tributaries to Valley Creek, while the fourth (Roebuck) is a tributary to Village Creek, which joins the Locust Fork. The Locust Fork and Valley Creek both join the Black Warrior River to the west.

The first population of watercress darters was collected at Glenn Springs in 1964. Additional field work has resulted in the location of three other spring populations: Thomas (1976), Seven (2002), and Roebuck Spring (1978) (Figure 1). The greater Birmingham metropolitan areas encompass all of these sites, which are threatened with groundwater pollution and the presence of extensive impervious surfaces (e.g., roads, parking lots, and roofs), which divert water away from the recharge area of the springs' aquifers and lessens flows. In 1970, the Service officially recognized the watercress darter as an endangered species (USFWS 1970). Periodic population monitoring has indicated that the fish continues to decrease in numbers (Howell 1985; Moss and Haffner 1991; and Moss 1995).

Watercress Darter NWR, located within the city limits of Bessemer, Jefferson County, Alabama (Figure 3), was established by the Service in 1980 to provide protection for the watercress darter and to conserve and restore its crucial habitat. Today, the 25-acre refuge consists of two ponds, several stands of mixed pine-hardwoods with shrubs, and a single residence. Thomas Spring is a one-quarter-acre pond where a population of watercress darters was found in 1976. A second pond was constructed on the refuge in 1983 by the Service to provide additional habitat for the darter.

Currently, Watercress Darter NWR is unstaffed and is administered by personnel from Mountain Longleaf NWR in Anniston, Alabama, and falls under the administrative umbrella of the Wheeler NWR Complex headquartered in Decatur, Alabama.

REFUGE HISTORY AND PURPOSE

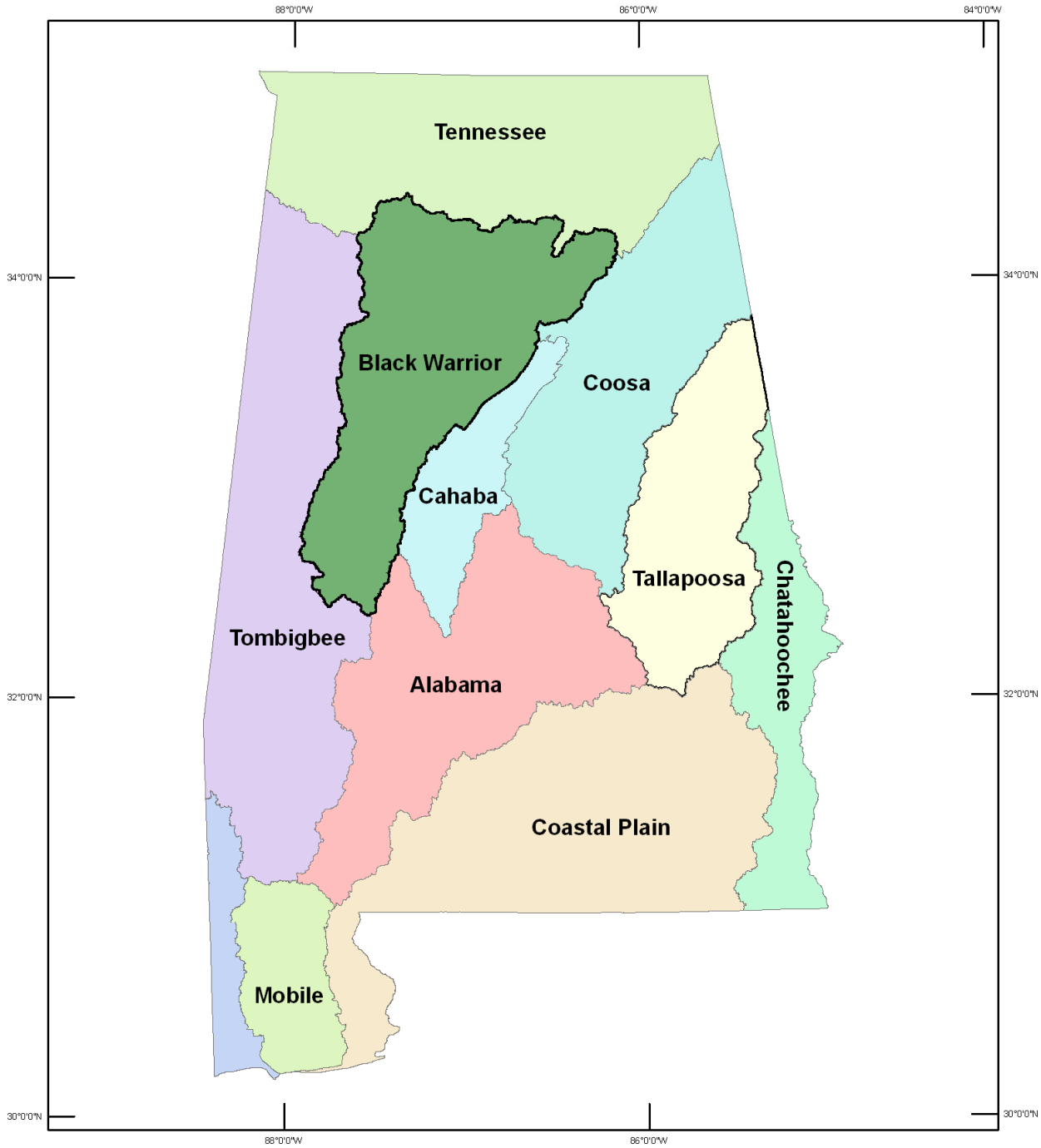
The watercress darter was first discovered at Glenn Springs, a tributary of Valley Creek, in 1964. No other watercress darter populations were found until 1976, when a population was discovered in Thomas Spring, a tributary of Halls Creek. Little is known about the history of Thomas Spring, although it was apparently dammed 20 years prior to the discovery of watercress darters. This action created excellent habitat for the darters by providing slow-moving backwaters that allowed dense aquatic vegetation to become established. Thomas Spring was named for the Thomas family that owned the land in the 1950s. Prior to the Thomas family, there were several landowners, with the most important or significant being the McAdory family that probably owned the land in the 1880s. The spring was no doubt important for the stagecoach line running from Tuscaloosa to Pinson, Alabama. So it does have significant local history importance.

Figure 2. Black Warrior River Watershed



U.S. Fish & Wildlife Service
Watercross Darter National Wildlife Refuge
Jefferson County, Alabama

Major Watersheds in Alabama



PRODUCED BY WHEELER NWR COMPLEX
DECATUR, ALABAMA
MAP DATE: 4/17/07

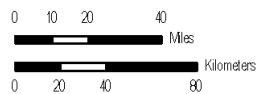
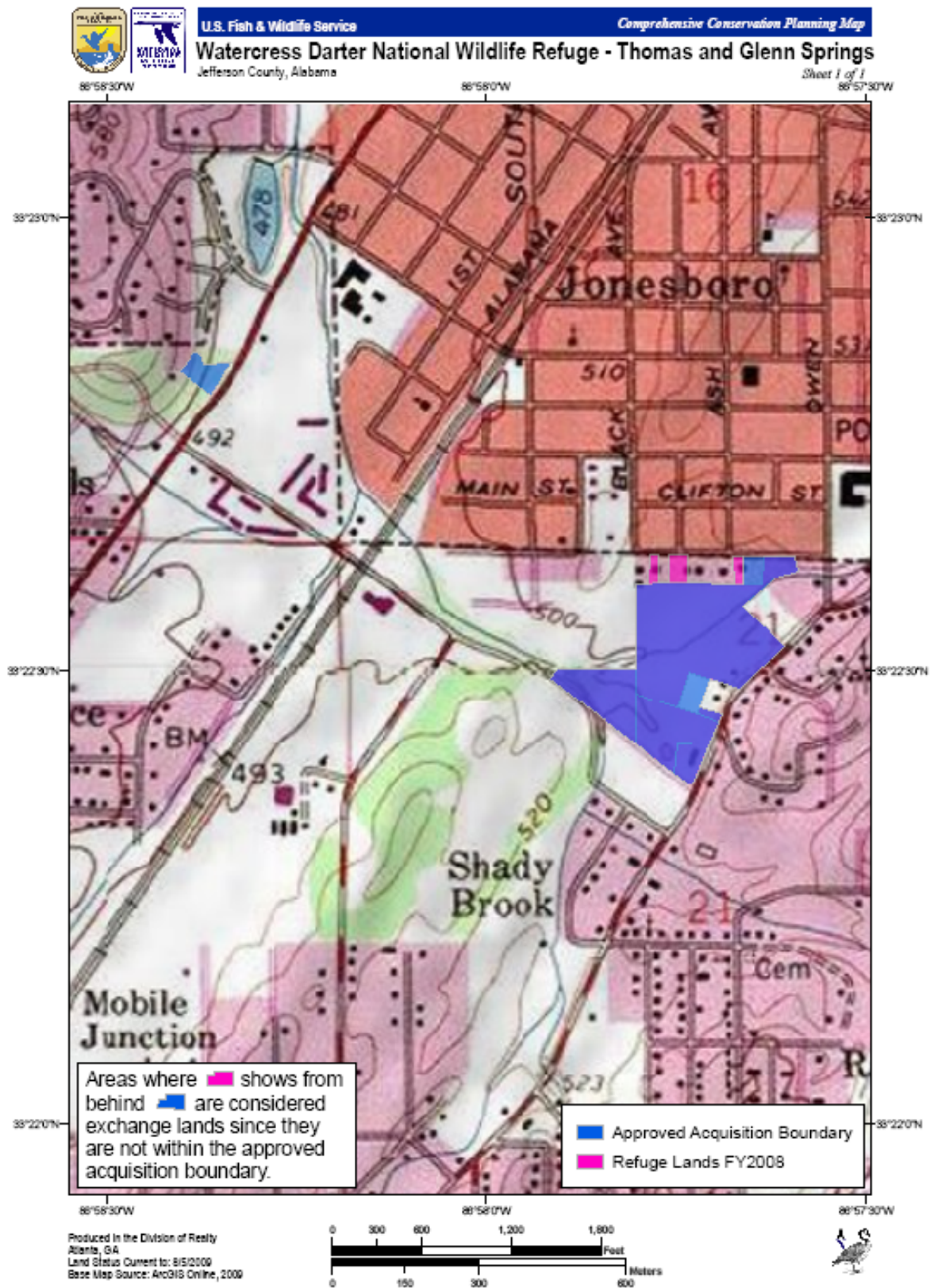


Figure 3. Approved acquisition boundary for Watercress Darter NWR – Thomas and Glenn Springs



In 1977, the former landowner of Thomas Spring introduced grass carp (*Ctenopharyngodon idella*), to clear the aquatic vegetation in the spring. By October, the grass carp had removed most of the spring's vegetation up to the shoreline. Only a single watercress darter was collected during sampling at that time.

Planning efforts for the establishment of Watercress Darter NWR were completed by the Service in 1979, and included the planned acquisition of 1.5 acres at Thomas Spring and a 1.0-acre tract at Glenn Springs. On October 1, 1980, the Service purchased 7.1 acres in fee title around Thomas Spring, naming the property Watercress Darter NWR. This refuge was established by the Service under the auspices of the Endangered Species Act of 1973 "...to conserve fish or wildlife which are listed as endangered species or threatened species" in order to protect Thomas Spring and its population of watercress darters.

Prior to federal acquisition, Thomas Spring was privately owned and located in rural Jefferson County, Alabama. Since that time, the city of Bessemer, Alabama, has grown substantially to include the area containing Thomas Spring. Environmental impacts associated with urban development are impacting watercress darter populations and their habitats.

After the refuge was established, the carp were removed and the spring was re-vegetated with *Chara sp.*, *Nitella sp.*, and *Spirogyra sp.* in early 1981. Soon thereafter, a population of watercress darters was relocated from Glenn Springs to Thomas Spring. In 1983, the Service constructed a pond just downstream from Thomas Spring, established aquatic vegetation in the pond, and in January 1988, relocated 100 watercress darters from Thomas Spring into the newly constructed pond.

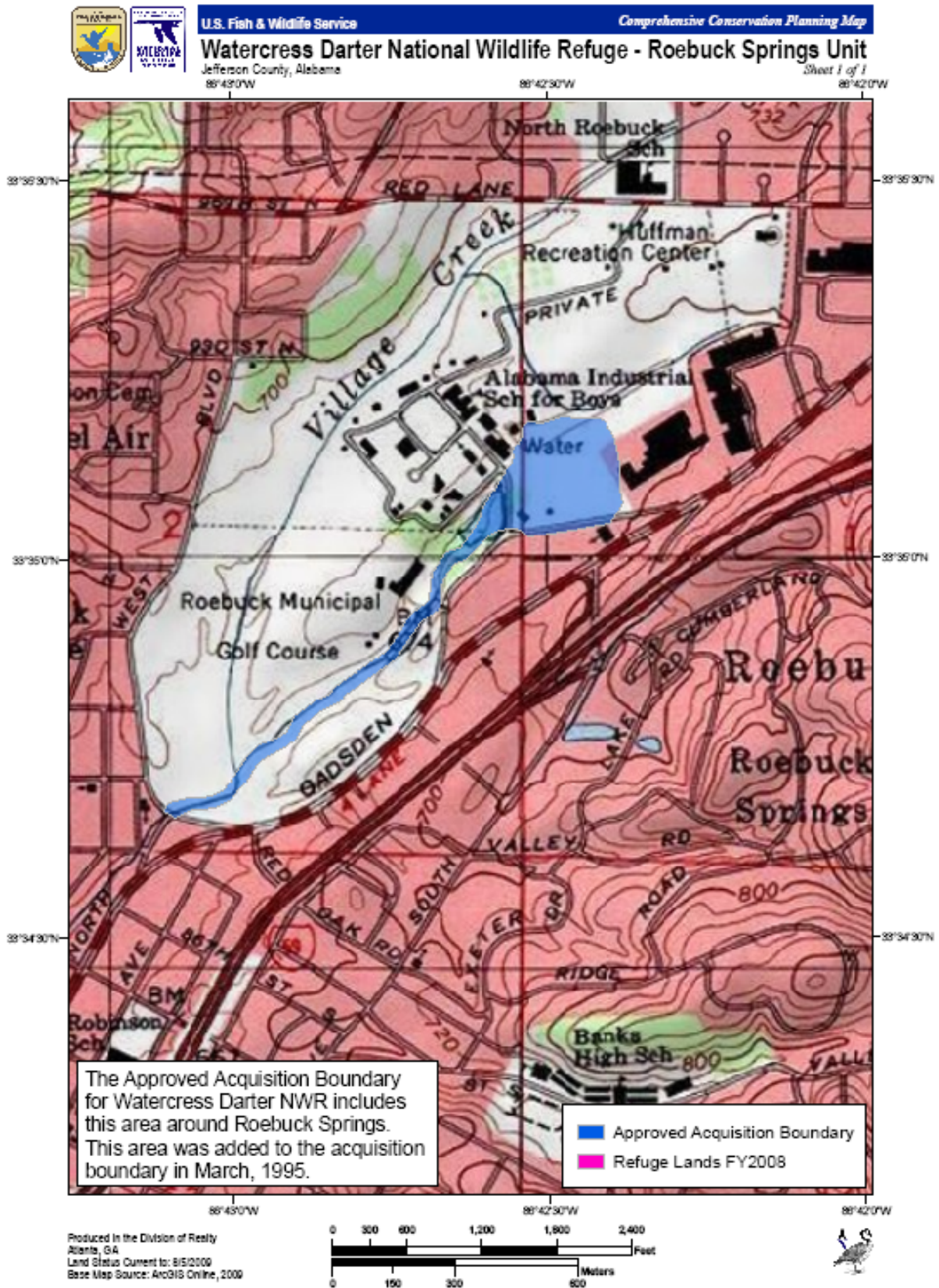
In 1988, a new population was established by transplanting watercress darters from Roebuck Springs to Tapawingo Springs, a tributary of Turkey Creek, in Jefferson County. An expansion of 30 additional acres (2 acres at Thomas Spring and 28 acres at Roebuck Springs) was approved on March 9, 1995, but only the 2-acre Thomas Spring parcel was purchased.

In 1999, a 16-acre tract of land adjacent to the refuge was proposed for acquisition. This action was initiated in order to provide a buffer and help protect a portion of the groundwater recharge area for Thomas Spring. This 18-acre parcel of land was called the McAdory Tract and in February 1999, it was surveyed for contaminants. Nothing other than household trash was found.

In November 1999, refuge staff met with 10 members of the Birmingham Audubon Society (BAS) to discuss management objectives and current issues facing the refuge and how BAS might be of assistance in accomplishing refuge goals. Earlier in 1998, BAS adopted the refuge under the Audubon Refuge Keepers program. The two most important issues that were discussed included periodic water quality monitoring and annual population surveys of watercress darters.

In 2001, the McAdory Tract was purchased by the Service. Today, the approved acquisition boundary for the refuge consists of 28 acres at Roebuck Springs, 25 acres at Thomas Spring, and 1 acre at Glenn Springs (Figure 4). Currently, the Service owns, in fee title, a total of 24.52 acres at Thomas Spring and no property has been acquired at Glenn Springs or Roebuck Springs. Although no land has been acquired at Glenn Springs, habitat protection efforts were undertaken in cooperation with the landowner at that site, but these conservation agreements have lapsed with the death of the landowner.

Figure 4. Approved acquisition boundary for Watercress Darter NWR – Roebuck Springs



Also in 2001, refuge staff coordinated with the Jefferson County Department of Environmental Services to design and install a new sewer line along Division Street, adjacent to the refuge. Once this project was completed in early 2002, the refuge staff was able to dismantle the existing septic tank and hook the residence up to the local sewer system. This effort was initiated to enhance the water quality in Thomas Spring, thus benefiting the endangered watercress darter.

SPECIAL DESIGNATIONS

Watercress Darter NWR does not include any special designation sites such as Research Natural Areas or Wilderness Areas. However, the area within the approved acquisition boundary near Roebuck Springs is within the Roebuck Springs Historic District.

Sustainable communities and species conservation and recovery require the joint efforts of private landowners and local communities, as well as state and federal governments. The synergy of federal, state, tribal, and private organizations, working together, will ensure that we not only protect the more important areas, but also reduce redundancy of effort, allowing precious resources to be directed where they are most needed.

ECOSYSTEM CONTEXT

CENTRAL GULF COAST ECOSYSTEM

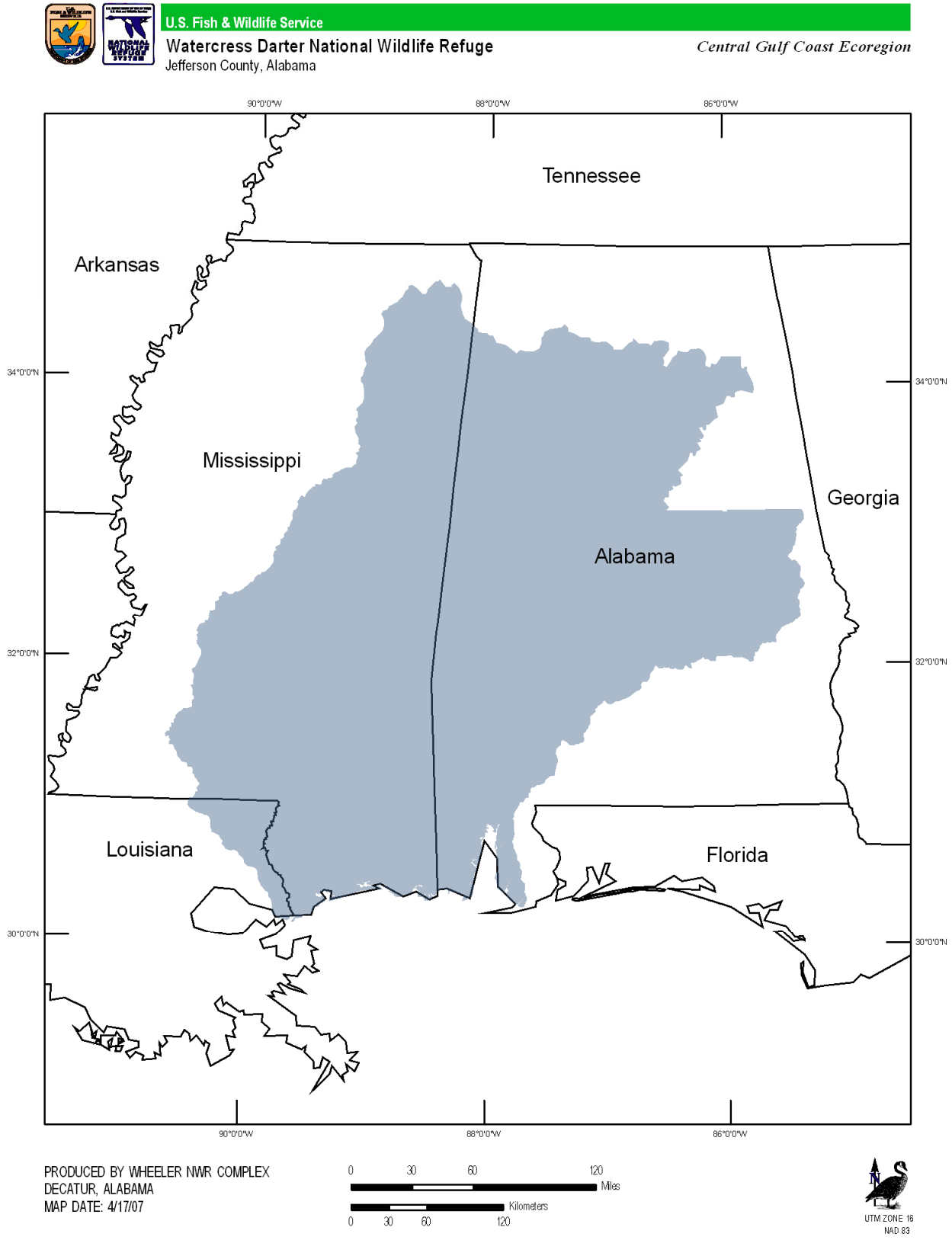
In approaching its mission to conserve wildlife and their habitats throughout the country, the Service has found it useful to divide the country into 53 distinct ecosystems, drawn primarily along watershed boundaries. Watercress Darter NWR is an active participant of conservation efforts within the Central Gulf Coast Ecosystem, which spans portions of Alabama, Mississippi, and Georgia (Figure 5). As such, the refuge collaborates in pursuing goals and objectives of the ecosystem as a whole, in addition to working toward achieving goals and objectives specific to itself.

Much of the Central Gulf Coast Ecosystem is characterized by a flat to rolling topography broken up by numerous streams and river bottoms. The uplands are dominated by pines; longleaf and slash in the south, originally, and shortleaf mixed with hardwoods in the north. These are fire-maintained systems that give way to loblolly pine and hardwoods in the damper areas, and to bottomland hardwood forests in the extensive lowland drainages. Within its southernmost reaches, the ecosystem encompasses estuaries and coastal waters and includes saline, brackish (mixed saline and fresh) and fresh waters, as well as coastlines and adjacent lands. Coastal dunes, strands, offshore barrier islands, and tidal marsh, in addition to the freshwater wetlands, pine woodlands, and live oak forests, are all interrelated parts of the functioning whole. As such, they each figure as crucial habitat for coastal fish and wildlife. Today, the ecological health of the Central Gulf Coast Ecosystem is significantly degraded in comparison to its historical baselines. Watercress Darter NWR is located in the northern portion of the ecosystem.

REGIONAL CONSERVATION PLANS AND INITIATIVES

The Alabama Comprehensive Wildlife Conservation Strategy (CWCS) (ADWFF 2005) assesses the status of Priority Fish Species as Priority 1, 2, or 3. The watercress darter is assigned the highest priority, Priority 1. Conservation recommendations include: monitoring water quality and quantity at all sites and investigating possible gas bubble disease at Roebuck Springs. The Alabama CWCS also lists Glenn Springs, Thomas Spring, Roebuck Springs, and Tapawingo Springs as Priority Areas for Conservation of Aquatic Greatest Conservation Need Species. The watercress darter population at Seven Springs was discovered after publication of the CWCS.

Figure 5. Central Gulf Coast Ecosystem



CENTRAL GULF COAST ECOSYSTEM PLAN

The restoration, recovery, and protection of pine habitats and associated plant and animal communities are the goals of the Central Gulf Coast Ecosystem Plan. Historically, the longleaf pine community was the predominant vegetative community of the southeastern coastal plain, with roughly 60 percent coverage in upland areas. Currently, most of the remaining longleaf pine and pine-savanna habitat is in private ownership. It is highly fragmented and degraded by logging, grazing, intensive site preparation, and fire suppression.

The regional ecosystem priorities for 2003 were extracted from the ecosystem team activity guidance, and those that involved the Central Gulf Coast Ecosystem included:

- Waterfowl management and resident and neotropical migratory bird monitoring;
- Control of invasive/exotic species;
- Outreach and environmental education;
- Significant decline in longleaf pine ecosystem;
- Fish passage; and
- Fisheries program support.

Restoring the functions and values of wetlands in the Southeast Region is a top priority. The goal is to prioritize and manage wetlands to most effectively maintain the ecosystem and possibly restore its biological diversity. Some areas are prioritized as focus areas for reforestation. It is widely recognized, however, that most of the forested wetlands acreage that has been cleared and converted to other uses in the Central Gulf Coast Ecosystem will not be reforested. Some areas would have lower value for reforestation and so are targeted for intensive management for non-forest-dependent species, such as waterfowl and shorebirds. Through combining efforts, apportioning resources, and focusing on available programs, the ecosystem's biological diversity can be restored.

ALABAMA COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY (2005)

The ADCNR's Division of Wildlife and Fresh Water Fisheries Comprehensive Wildlife Conservation Strategy (ADWFF 2005) 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 identified four broad objectives for this CCP to consider and promote as goals and objectives were established to ensure that the refuge continues its contribution to Alabama wildlife conservation and habitat integrity. These objectives are:

- 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; and

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- Improve existing partnerships and develop new partnerships between DWFF and state and federal natural resource agencies, non-governmental organizations and environmental groups, private industry, and academia.

In addition, the Alabama CWCS identified priority research, survey, and monitoring actions that are needed to fulfill conservation goals for the watercress darter. These actions are as follows:

- Conduct comprehensive status surveys at 1- to 2-year intervals;
- Determine life history requirements;
- Monitor water quality at all known locations of the watercress darter; and
- Investigate possible gas bubble disease at Roebuck Springs.

The Alabama CWCS also identified the highest priority conservation actions that are needed and key partnerships that should be developed in order to protect the watercress darter. These actions are as follows:

- Support full implementation of the Black Warrior River Basin Management Plan;
- Improve water quality and habitat quality throughout the basin;
- Support habitat and riparian restoration;
- Establish partnerships with ADEM, AFC, NRCS, Black Warrior Riverkeeper, Clean Water, and local governments such as the city of Bessemer; and
- Purchase Glenn Springs for inclusion in the refuge.

ECOLOGICAL THREATS AND PROBLEMS

HABITAT LOSS AND FRAGMENTATION

As a result of habitat loss and degradation, the Central Gulf Coast Ecosystem is experiencing biotic extinctions at a rate unparalleled elsewhere in the United States; within the last century, nearly 50 percent of United States' biotic extinctions have occurred in the region (Mobile River Basin Coalition 2004). The avian species most adversely affected by fragmentation include those that are area-sensitive (i.e., dependent on large continuous blocks of hardwood forest); those that depend on forest interiors; those that depend on special habitat requirements like mature forests or a particular food source; and those that depend on good water quality. Species such as the prothonotary warbler and cerulean warbler have declined significantly, and will require the benefits of large, managed forest blocks to recover and sustain their existence.

Fragmentation of bottomland hardwood forests has left many of the remaining forested tracts as biological oases surrounded by inhospitable agricultural lands. Intensive agriculture has removed most of the forested corridors along sloughs that formerly connected forest patches. The loss of connectivity between the remaining forested tracts hinders the movement of a large range of wildlife between tracts, and reduces the functional value of many remaining smaller forest tracts. The severed connections also result in a loss of gene flow needed to maintain genetic viability and diversity within wildlife populations. Thus, remaining populations are rendered even more vulnerable to habitat modification and degradation. Particularly for wide-ranging terrestrial species, re-establishing travel corridors to allow movement is of critical importance.

One the primary threats to fish and wildlife populations in Alabama is the historic and ongoing loss and degradation of habitat, largely due to development pressures related to the state's increasing human population. According to 2000 population estimates, Alabama currently has a population in

excess of 4,447,100, a 10 percent increase from 1990 to 2000. The U.S. Census Bureau estimates that by the year 2025, Alabamians will number 5.22 million, a 17 percent increase from 2000. To make matters worse, the Bessemer/Birmingham area, which surrounds all of the approved acquisition boundary for Watercress Darter NWR, is one of the most populated areas in the state, with a combined population in excess of 600,000 (Campbell 1997).

ALTERATIONS TO HYDROLOGY AND DEGRADATION OF AQUATIC ECOSYSTEMS

Southeastern states have the greatest numbers of imperiled and vulnerable freshwater fish species in the country. River/stream channel modifications and pollution have gradually eliminated large populations of native aquatic species, including fish, mussels, snails, insects, and crustaceans. Barriers to movement prevent anadromous fish, including Gulf Coast strain striped bass, Gulf sturgeon, and Alabama shad, from reaching spawning grounds and key habitat areas. Many other aquatic species have similarly become isolated. Without avenues for migration, impacts from land surface pollution runoff are exacerbated. Restoration of the structure and functions of a natural wetland is complicated by the fact that wetlands depend on a dynamic interface of hydrologic regimes to maintain water, vegetation, and animal complexes and processes.

This scenario also exists in the Black Warrior River basin, which is impounded throughout its length to provide barge navigation as far as Birmingham. This action has led to a large loss of river habitat, fragmentation and isolation of streams, and modification of the natural flow of water. These and other large-scale, man-made hydrological alterations have changed the spatial and temporal patterns of flooding throughout the entire basin, in terms of both extent and duration of flooding, in comparison with the natural hydrology regime. This curtailment of the flooding regime has had an enormous impact on the forested wetlands and their associated wetland-dependent species.

In addition, large urban population centers, such as the Bessemer-Birmingham area, use both ground and surface water for industry, mining, drinking, bathing, and other household uses. This action reduces water quantities at a rapid pace. Recent droughts in the south have caused groundwater aquifers to be depleted faster than natural recharge can occur. These factors directly impact natural limestone springs, such as Thomas, Glenn, Seven, and Roebuck Springs.

Although the relationship between urbanization and water pollution is complex, it is relatively easy to understand. Urban areas contain many people in relatively small areas, and the activities of these people produce pollutants and cause pollution. Fortunately, most urban area pollutants are of a point source nature and are controlled by discharge regulations. However, as an area is urbanized, the land is altered to meet the needs of the people who live there. This alteration of the land accelerates nonpoint source pollution because it changes the way water moves, increases surface runoff, decreases recharge of groundwater (aquifers), and causes erosion.

Moving with the water and eroded soil are other pollutants, which cause numerous water quality problems downstream. As urbanization increases, the natural hydrology or water movement of an area changes in response to site clearing, grading, and the addition of impervious areas. Even natural depressions that once temporarily held water and delayed runoff are graded to a uniform slope. The cumulative effects of this paving, filling, grading, and compacting of the soil are enormous. The most common problems are the increased runoff, lack of groundwater recharge, and associated erosion and sediment loadings to surface waters (ADEM 2006).

Streams experience more rapid flows and greater volumes, and banks erode as channels change their contours to accommodate the increased flows. In an urbanized watershed, surface runoff is further magnified after construction is completed. The excessive flow from all the impervious surfaces, such as rooftops, roads, parking lots, and sidewalks, decreases infiltration. This makes it necessary to construct other runoff conveyances or modify existing drainage systems to handle all the extra runoff while avoiding erosion of stream banks and steep slopes.

A potential threat to the Glenn Springs population of watercress darters is the proximity of Route 20. Expansion of the highway could damage the darter's limestone spring habitat. The proximity of each of the naturally occurring watercress darter populations to highways increases the risk of lethal chemical spills. Contamination of the habitat in the Roebuck Springs basin and its run has been identified along with an alarming apparent decline in the watercress darter population at that site. Due to concern over the decline, the Service has conducted a contaminant investigation in the Roebuck Springs basin and its immediate run. Analysis of sediment and snail samples reported high levels (up to 12.0 parts per million) of polycyclic aromatic hydrocarbons. This material is known to be highly toxic to aquatic life even at levels considerably below that found in Roebuck Springs and its run (USFWS 1991).

Roebuck Springs is located on the campus of the Jefferson County Youth Services Facility and the spring run flows through Hawkins Municipal Park, in Birmingham (Roebuck), Alabama (Fig. 4). The spring basin includes approximately 1.5 acres of impounded waters whose source is Roebuck Springs. The spring run was apparently impounded by a low, earthen dam, resulting in the 1.5-acre pond (D. Drennen, pers. comm). The springhead, spring pool and spring run are within 200 feet west and north of Roebuck Boulevard and Roebuck Parkway. The school facility grounds are to the north with Roebuck Springs Golf Course and Hawkins Municipal Park grounds to the west and southwest. There are many parking lots and small driveways and connecting streets within the area and one storm sewer drains directly into the spring pond. Interstate 59 and Highway 11 are less than 0.25-mile south of the pool and roughly parallel to the spring run. The property line between the state-owned lands and the city's park runs across the spring pond a short distance upstream from the earthen dam location.

The Jefferson County Youth Service's Facility staff actively protects the water quality of the Roebuck Springs pool and spring run by maintaining a buffer zone around its portion of the spring pool and by limiting the use of herbicides and entry into the area. Historically, the spring pool has had high levels of *E. coli* bacteria (USDOI 1979) and polycyclic aromatic hydrocarbons levels were high and are suspected to be potentially harmful to the watercress darter (USFWS 1991). Traffic is dynamic along all roadways mentioned and is conducive to vehicle accidents and toxic spills.

In the 1970s, construction of Interstate 59, just a 0.25-mile south of the spring pool, destroyed two spring heads of the Roebuck Springs system (Drennen 2004). The extent of the negative impacts caused by the destruction to the spring's hydrology is unknown. Additionally, Magic Screwdriver Cave, located in a residential area less than 0.5-mile south of Roebuck Springs, is interconnected hydrologically with the Roebuck Springs system (Hearn 1993). Since 1983, the condition of the groundwater within the cave has declined (S. Spencer, pers. comm.).

Water level fluctuations in the spring pond and spring run have occurred historically due to beaver activity and major rain events. According to Birmingham Park and Recreation officials, in the past, high water levels at Roebuck Springs pool caused by beaver dams, have occasionally led to beaver dam breaks, resulting in flooding of tennis courts located just downstream from the earthen dam, resulting in costly maintenance activities to repair damages (Moss 2008).

On September 19, 2008, while attempting to remove a beaver dam from on top of the earthen dam at the base of the Roebuck Springs pool, the earthen dam was breached and removed by a city of Birmingham work crew. Because of this, the water level within the spring basin suddenly dropped approximately one meter and up to 57 percent of the aquatic habitat for the watercress darter was quickly drained (Moss 2008, Duncan et al. 2008, D. Drennen, pers. obs., Fluker et al. 2009). The remaining water within the spring pool area was limited to a small channel flowing through the area and a small, shallow pool located near the breached section of the dam. The sudden dam removal resulted in the death of an estimated 11,760 watercress darters (Fluker et al. 2009). The city installed a new water control structure in March 2009, to restore water levels at the earthen dam and the watercress darter population continues to recover from the fish kill of September 2008. Data collected in the spring of 2009 indicated depressed reproduction and recruitment in the spring pond (Fluker et al. 2009; Richardson et al. 2009). Unpublished data collected in September 2009 by biologists under contract with the city of Birmingham allegedly indicated that watercress darter relative abundance in the spring pond appeared higher than it had been since 1988 and total population estimates suggested a marked increase in the population size since 1995 (Richardson et al. 2009). A more recent data collection, on June 8, 2010, funded by the Service, also indicates that reproduction and recruitment in the spring pond has improved since the spring of 2009 (Spadgenske, pers. comm.). Initial indications of relative abundance suggest that recruitment may be occurring within different age classes (D. Drennen, pers. comm.). Regardless of the degree to which the Roebuck Springs population may be recovered, the dam removal, sudden loss of habitat, and death of 11,760 watercress darters dramatically demonstrates the precarious situation facing this species in an urban environment.

PROLIFERATION OF INVASIVE PLANTS

Compounding the problems faced by aquatic systems is the growing threat from invasive aquatic vegetation like alligator weed and willows. Static water levels caused by the lack of annual flooding and reduced water depths, resulting from excessive sedimentation, have created conditions favorable for the establishment and proliferation of several species of invasive aquatic plants. Additionally, the introduction of exotic vegetation capable of aggressive growth is further threatening viability of aquatic systems. These invasive aquatic species threaten the natural aquatic vegetation important to aquatic systems, and choke waterways to a degree that often prevents recreational use. Other invasive plant species that are specifically problematic on the refuge are kudzu and Chinese privet. Various species of non-native wildlife and fish also flourish in this humid temperate climate.

PHYSICAL RESOURCES

CLIMATE

The climate of central Alabama is humid and temperate, with temperatures ranging from -5°F to 110° F. Summers are long and hot, and generally the winters are mild and pleasant. This means the summers are warm and humid, due to domination of maritime tropical air from the Gulf of Mexico and the Atlantic Ocean. The incoming warm, moist air forms convectional storms and thunderstorms. The winters are relatively mild, with an occasional bout of more extreme weather when continental polar air masses sweep down from the northwest and collide with the maritime tropical masses to create frontal storms (NOAA 2006).

The average summer temperature is 79°F, with an average maximum temperature of 89°F. In winter, the average temperature is 42°F and the average daily minimum temperature is 32°F. The average temperature of the area ranges from 60- 64°F depending on altitude and other factors. Temperatures at higher elevations are generally 5 to 6°F lower. Occasionally, temperatures in the winter will drop below freezing and will sometimes remain below freezing for 1 to 4 days. Humidity is normally 72 percent or greater in the summer months (NOAA 2006).

Rainfall is approximately 54 inches (1,371.6 mm) per year, and there is seldom extended accumulations of snow or ice (NOAA 2006). Precipitation is highest during the spring and lowest during the fall. Rainfall events that produce flooding are most common from the middle of 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 (NOAA 2006).

GEOLOGY AND TOPOGRAPHY

Watercress Darter NWR is located in the Tennessee Section of the Valley and Ridge Province of the Appalachian Highland, which was developed on tightly folded and thrust-faulted Paleozoic sedimentary rocks, consisting of numerous ridges separated by deep steep-sided valleys. A unique feature of this valley and ridge province is the “zigzag” nature of the ridges. The area surrounding the refuge is underlain by 500- to 570-million-year-old Cambrian-aged limestone and shale of the Conasauga formation. The weathering of the limestone bedrock has given rise to many of the natural occurring springs in the area.

The Conasauga Formation or Group of northern Alabama consists of a sequence of interbedded shale and thin-bedded, dark gray, relatively pure limestone 1,000 to 2,000 feet thick. In the Bessemer-Birmingham area, Jefferson County, Alabama, this formation has been extensively mined for cement limestone (USDA 1954).

The topology of the area surrounding the refuge is generally flat (0-2 percent) slopes to gently rolling (3-6 percent slopes), with a few abrupt hills. Land elevations range from 500 feet above mean sea level (MSL) to around 510 feet MSL at the refuge’s northeastern boundary.

SOILS

The majority of the soils located on lands within Watercress Darter NWR have developed from the weathering of high-grade limestone. Soils are generally acidic, low in organic matter, and are usually fertile. Ninety-eight percent of the refuge consists of the Sullivan-Ketona-Urban land complex, 0 to 2 percent slopes. The Sullivan series consists of very deep, well-drained, moderately permeable soils that formed in loamy alluvium (limestone, sandstone, and shale) on flood plains. Most areas are occasionally flooded and depth to bedrock is more than 5 feet.

The Ketona series consists of deep, poorly drained, slowly permeable soils that formed in alluvium and residuum from limestone. These soils are on flood plains and depressional areas in limestone valleys. They are saturated with water in late winter and early spring and are subject to flooding or ponding. Slopes are dominantly 0 to 2 percent but range to 4 percent. Solum thickness and depth of limestone bedrock range from 40 to more than 60 inches. Many pedons contain small, round, brown or black concretions and limestone fragments. These soils are subject to frequent brief flooding due to stream overflow or ponding due to slow runoff or lack of drainage outlets.

HYDROLOGY

All lands within the approved acquisition boundary for Watercress Darter NWR are located within the Black Warrior Watershed, which is comprised of the Black Warrior River and its many tributaries. The Black Warrior Watershed is divided into five USDA-NRCS 8-Digit Hydrologic Unit Code (HUC) Cataloging units: the Sipsey Fork, Mulberry Fork, Locust Fork, Upper Black Warrior, and the Lower Black Warrior (Black Warrior Clean Water Partnership 2003). Roebuck Springs, a tributary of Village Creek, is located within the Locust Fork. Thomas Spring and Glenn Springs, both tributaries of Halls Creek, are found within the Upper Black Warrior.

The Black Warrior River is formed by the confluence of the Mulberry, and Locust Forks. It then flows south to the fall line at Tuscaloosa, Alabama, where it joins the Tombigee River at Demopolis, Alabama. It is approximately 178 miles (286 km) long and drains an area of 6,275 square miles (16,250 km²). The river is impounded along nearly its entire course in a chain of narrow reservoirs for hydroelectricity, drinking water, and as an aid to navigation.

Locust Fork Watershed (HUC 03160111)

The Locust Fork of the Black Warrior River contains fifteen sub-watersheds primarily located within Jefferson, Blount, Marshall, and Etowah Counties. The entire watershed drains approximately 1,209 square miles of one of the most industrialized and commercialized areas in Alabama. The streams drain sandstones and shales and occur in steep-sided valleys, creating high gradient, riffle-run streams characterized by abundant and diverse habitat. Natural vegetation consists of mixed mesophytic forest restricted mostly to the deeper ravines and escarpment slopes, and an upland forest characterized by mixed oaks with shortleaf pines (Black Warrior Clean Water Partnership 2003).

Village Creek

Village Creek originates in the vicinity of Roebuck, Jefferson County, Alabama, and travels west through northern Birmingham. The upper segment of Village Creek drains a major urban area and has typical stream characteristics of an urbanized area, such as poor habitat, degraded water quality and quantity, and stressed biological communities. The urbanized landscape creates dynamic flow events, reduced riparian zones, increased siltation, and other conditions that destroy habitat and impair water quality, thus making it difficult to sustain a healthy aquatic community (ADEM 2006).

Upper Black Warrior Watershed (HUC 03160112)

The Upper Black Warrior Watershed drains twelve sub-watersheds located within Tuscaloosa, Fayette, Jefferson, and Walker Counties. The watershed drains approximately 1,255 square miles and the tributaries located in the Fall Line Hills are generally low gradient, habitat poor, glide/pool streams. Streams located in the Fall Line Hills flow year-round due to the extensive sand and gravel aquifers in the region. Riverine wetlands are characteristic habitat of this watershed.

Halls Creek

Halls Creek originates in the vicinity of Bessemer, Jefferson County, Alabama, and travels northwest through western Bessemer. The upper segment of Halls Creek drains a major residential/urban area and has typical stream characteristics of a highly urbanized area, such as poor habitat, degraded water quality, and stressed biological communities. After crossing under 9th Avenue (Bessemer Superhighway), Halls Creek drains into Valley Creek.

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. As a result, 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. Currently, there are two monitoring stations located near Watercross Darter NWR in the cities of McAdory and Fairfield, Jefferson County, Alabama. Since the late 1970s, Jefferson County has exceeded the national standard for ground-level ozone, the primary component of urban smog. Ozone is not directly emitted into the air but formed through a series of chemical reactions between volatile organic compounds (VOCs) and nitrogen oxides (NO_x), in the presence of heat and sunlight. Because heat and sunlight are the catalysts for ozone formation, ozone is only a problem for Jefferson County in the summer months (Alabama Partners for Clean Air 2006).

Initial efforts to reduce ozone in Jefferson County focused on industrial sources of pollution. The State of Alabama submitted plans to EPA in 1979 that required VOC reductions at large industrial facilities. Similar controls were required at smaller industrial facilities in the mid-1980s. These industrial controls, combined with new national requirements for less-polluting motor vehicles and gasoline, appeared to have brought the Birmingham nonattainment area into compliance by the early 1990s.

The State of Alabama requested that EPA redesignate Jefferson County to "attainment" status in March 1995. However, in August 1995, Jefferson County experienced a new violation for ozone and as a result EPA disapproved the request (ADEM 2007). In 2005, EPA officially acknowledged that Jefferson County has met the national air quality standard for ozone, based on monitored data from the period 2003-2005. The county met the stringent 8-hour standard just 2 years after achieving compliance with the old 1-hour standard (ADEM 2007).

Unfortunately, the Birmingham area was redesignated to nonattainment effective June 12, 2006. During the summer of 2006, the Helena monitor violated the standard due to prolonged hot and stagnant weather. Therefore contingency plans must be initiated. ADEM will evaluate possible control measures to determine what is needed to help return the area to attainment (ADEM 2006).

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 watershed scale.

The unique feature of the Black Warrior River Watershed is the presence of extensive coal deposits. In fact, the middle portion of the watershed is the largest coal producing area in southern North America (AWFFD 2005). The history of mining coal has resulted in an unusually high proportion of impaired streams in the watershed.

The Clean Water Act 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 470 miles of streams in the Black Warrior River Watershed with impaired water quality. About half of these impairments are related to abandoned mines.

Additional sources of impairment include organic enrichment, siltation and pathogens, all from an agricultural or urban origin (AWFFD 2005).

Two tributaries associated with Glenn Springs, Thomas Spring, and Roebuck Springs are currently listed on Alabama's draft 2006 303(d) list; Valley Creek and Village Creek. Thomas Spring and Glenn Springs are small tributaries of Halls Creek, which drain into Valley Creek and Roebuck Springs is a small tributary of the upper segment of Village Creek. See Table 1 for a complete description of causes and sources of impairment.

Factors which are most likely to limit or cause the decline of watercress darter populations are those that reduce the quantity or quality of its habitat. The recent growth of shopping centers and apartment complexes in the Birmingham-Bessemer area has included extensive paving. Rainfall is not available to recharge aquifers that feed local springs at historic levels when the water is swiftly channeled off parking lots into drains.

The quantity and quality of Glenn Springs aquatic habitat have varied considerably since the watercress darter was first discovered there in 1964 (Howell 1989). A low, rock dam was removed for several years which increased the velocity of flow, reduced the water depth, and diminished the backwater area for vegetative growth upon which the darter depends. Additionally, the quantity of water has been reduced due to withdrawals from the spring basin by a nearby resident and from the spring run by Aldridge Nursery. Indications of water quality or quantity problems have been noted at each of the sites where the watercress darter naturally occurs.

Prior to September 2008, the water quality at Roebuck Springs had been adversely affected at times by aromatic hydrocarbons and high *E. coli* concentrations (Moss 2008). Immediately after the September 2008 dam removal at the Roebuck Springs site, the water level within the spring basin dropped approximately one meter, and up to 57 percent of the aquatic habitat for the watercress darter was drained (Moss 2008, Duncan et al. 2008, D. Drennen, pers. obs., Fluker et al. 2009). The remaining water flow was confined to a small channel flowing through the basin and a small pool area located near the breached section of the dam. The rapid de-watering killed a large amount of the vegetation in the former pool area and raised concerns about de-oxygenation and other water quality problems as the water levels were restored. However, the water levels were restored gradually and water quality monitoring never demonstrated a problem with oxygen concentrations or contaminant levels. (E. Spadgenske, pers. comm.).

In addition, increased shading by trees of the spring runs and the spring pool-bank side and decreased water flow in Thomas Spring (Watercress Darter NWR) and Seven Springs due to droughts in 2008 and 2007, may contribute to the loss or reduction of certain aquatic plant species such as watercress (*Nasturtium* sp.). Duncan et al. (2010) noticed increased watercress darter activity in vegetative areas of the Seven Springs spring run where sunlight penetrated and spotlighted areas of the spring run. This may also be occurring in Glenn Springs and Seven Springs (D. Drennen, pers. obs.). Before the dam removal at the Roebuck Springs site (September 2009), reduction of watercress and other aquatic plants in the Roebuck Springs run was associated with use of herbicides in golf course management.

The aquifers in the Jefferson County area are generally susceptible to contamination from the surface. Where sinkholes are present, the aquifer may be extremely susceptible to surface contamination because there is a direct link to the aquifer (Planert and Pritchett 1989). The specific direct or discreet recharge area for each spring serving as habitat for the watercress darters is unknown. As long as the discreet recharge area remains unknown and unprotected, the risk is especially high that one or more of the springs could be contaminated or lose significant flow from impervious areas.

Water quantity/water rights issues continue to be discussed by local municipalities. Water quality assessments and monitoring are not conducted on Watercress Darter 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.

Table 1. Select data from Alabama’s Draft 2006 303(d) list

| Assessment Unit ID | Waterbody Name | County | Uses | Causes | Sources | Date |
|---------------------|---------------------|-----------|---------------------------|---------------------------------|---|------------------|
| AL03160112-0101_101 | Valley Creek | Jefferson | Limited Warmwater Fishery | Metals | Urban runoff/storm sewers Collection system failure | 2000, 01, 02, 04 |
| AL03160111-1-140_02 | Upper Village Creek | Jefferson | Limited Warmwater Fishery | Pathogens Pesticides (Dieldrin) | Urban runoff/storm sewers Collection system failure | 2000, 01, 02, 04 |

BIOLOGICAL RESOURCES

HABITAT

Vegetation communities on the refuge consist of a mosaic of pine-hardwood forest stands, and shrubs interspersed with ponds and limestone springs.

Fish and Wildlife

Not only does Watercress Darter NWR provide crucial habitat for the endangered watercress darter but it hosts a variety of other wildlife. A complete biographical listing of bird species found on the refuge is documented in Appendix H.

Watercress Darter

The watercress darter (*Etheostoma nuchale*) is a small, very colorful fish that thrives in deep, slow-moving backwaters of limestone springs that contain areas of thick aquatic vegetation, such as watercress (*Nasturtium*), *Chara*, and *Soirocivra*. Such conditions allow for large populations of aquatic insects, crustaceans, and snails, which form this darter's diet (Howell and Caldwell 1965). The vegetation also plays an important role as the substrate upon which the darter lays its eggs (Stiles 2004). They are found mainly in aquatic vegetation in springs and spring runs and are subject to predation from green sunfish, bluegills, and sculpins.

The watercress darter was first discovered at Glenn Springs in 1964 (Boschung and Mayden 2004). Additional field work by personnel from Samford University, Birmingham, Alabama, located three other populations: Thomas Spring (tributary of Halls Creek), Seven Springs (tributary of Nabors Branch), and Roebuck Springs (tributary of Village Creek). After the initial discovery of watercress darters in Glenn Springs, collections from 116 springs and spring-creeks in the Jefferson-Tuscaloosa-Shelby County areas resulted in discovery of two new populations: one at Thomas Spring and the other at Roebuck Springs (Howell and Zeiger 1978). In June 1986, W.M. Howell was funded by the State of Alabama's Non-Game Wildlife Program and the Service to conduct necessary studies and identify additional springs for potential transplant sites for the watercress darter. His recommended transplant sites were: Tapawingo Springs, Caldwell Springs, Avondale Springs, Indian Valley Springs, Prince Springs, and Hawkins Spring (Howell et al. 1986). Attempts to relocate watercress darters in Avondale Springs failed and transplanting was never attempted at Indian Valley Springs.

In an attempt to establish a new population of watercress darters, R.D. Caldwell and W.M. Howell, in 1965, collected 21 nuptial males and 22 nuptial females from Glenn Springs and transplanted them into Prince Spring, a tributary to Valley Creek in Jefferson County, Alabama. Subsequent collections in Prince Spring yielded no watercress darters; however, many redspot darters (*Etheostoma artesia*) were collected. The redspot darter may be a competitor of the watercress darter (Howell and Black 1976). The redspot darter has also been found in Glenn Springs over the last 1.5 years. Prince Spring has since been severely impacted by urbanization and man-made changes in the topography.

During January 1988, a transplant of 200 fish each was made from Roebuck Springs to Tapawingo Springs, a tributary to Turkey Creek and to Avondale Spring, both in Jefferson County, Alabama (Howell 1988). Reproduction has since occurred repeatedly in Tapawingo Springs. No watercress darters have since been collected from Avondale Spring, and it is unlikely that any exist due to the intensive aquatic plant control being conducted by the Birmingham Parks and Recreation Department.

In 1983, the Service constructed a pond just downstream from Thomas Spring and established aquatic vegetation into the pond. In January 1988, 100 watercress darters were relocated from Thomas Spring into this newly constructed pond. Prior to federal acquisition, Thomas Spring was privately owned and located in rural Jefferson County, Alabama. Since that time, the city of Bessemer, Alabama, has grown substantially to include the area containing Thomas Spring. Environmental impacts associated with urban development are impacting watercress darter populations.

In 1970, the watercress darter was officially recognized as an endangered species by the Service (USFWS 1970). This species was first described by Howell and Caldwell in 1965. Howell recognized the watercress darter was closely related to the Gulf darter, *Etheostoma swami*, but differed in details of body proportions, development of lateral line and cephalic sensory canals, certain fin-ray counts, and habitats (Howell and Caldwell 1965).

The Service's recovery plan describes the watercress darter as a small, robust species growing to a maximum size of just over 5 centimeters (2 inches) in total length. Breeding males have red-orange and blue fins, and red-orange on the lower part of the body. The lateral line contains 35 to 42 scales, is incomplete, and has 12 to 24 pored scales. The nape is naked. The largest specimen known is a female 2.5 inches in length (USFWS 1991).

Today, very little life history information is known about the watercress darter. Standardized population survey results for the watercress darter were conducted annually from 1985 through 1989 (Howell 1989), and during 1991 (Moss and Haffner 1991), indicate an apparent downward trend for all of the naturally occurring populations that were known at the time. All available information about the watercress darter was summarized in the species 5-year review (USFWS 2007) and pointed out that the very limited distribution of the species makes it highly vulnerable to threats that reduce water quantity or quality. Although not conclusive, limited population survey results indicate an apparent downward trend for all of the naturally occurring populations. The very limited distribution of the watercress darter makes it highly vulnerable to threats. Factors which are most likely to limit or cause the decline of watercress darter populations are those that reduce the quantity or quality of its habitat.

Landbirds

A bird survey of the refuge was started in 2007, with ornithology class field trips from Samford University and observations made by members of the Birmingham Chapter of the National Audubon Society. Appendix H is a listing of the bird species noted during these visits followed by a field check list.

Mammals

Due to the urban setting, limited size of the refuge, and impaired habitats, no large mammals, such as deer, have been documented on the refuge and diversity of other mammals is believed to be low. Medium-sized mammals occurring on the refuge include opossum, armadillo, eastern cottontail, raccoon, gray squirrel, and beaver. Surveys for small mammals have not occurred on the refuge but common species, such as cotton mouse, white-footed mouse, and Hispid cotton rat, are assumed to occur. Due to the urban setting where the refuge is located, predation from domestic dogs and cats is assumed to be very high.

Amphibians and Reptiles

Various species of water snakes are common, especially the broad-banded, yellow-bellied, and midland water snakes. Poisonous snakes include the copperhead and cottonmouth. Rat snakes are likely the most abundant snake on Watercress Darter NWR. Black racers, corn snakes, eastern ribbon snakes, and eastern garter snakes are also frequent.

The more common turtle species are the eastern box turtle and the southern painted turtle. The ground skink, five-lined skink, and common anole are three of the most common lizard species. Many different species of frogs and toads are found on the refuge. 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. 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.

Fisheries

Watercress Darter NWR is home to several species of fishes. Some of these species include largemouth bass, bluegill, redear sunfish, and mosquito fish.

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.

The refuge follows these legal mandates to protect the public's interest in preserving the cultural legacy that may potentially occur on the refuge. 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 ponds, a Service archaeologist conducts an archaeological survey of the site. The results of this survey are submitted to the Service's Regional Archaeologist, as well as the State Historic Preservation Officer (SHPO), which, in Alabama, is a member of the Alabama Historical Commission. The SHPO then reviews the surveys and determines whether or not cultural resources will be impacted, that is, whether any properties listed 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 Watercress Darter NWR have been determined to be eligible for listing in the National Register of Historic Places. As of this date, no known cultural resource inventories have been conducted on Watercress Darter NWR.

According to the Jefferson County Soil Survey (1982), many of the original settlers of Jefferson County emigrated from Tennessee in 1813, settling in the agricultural land of the Jones Valley (what is currently the Greater Birmingham Area) (Spivey 1982). A major stagecoach line ran from Tuscaloosa to Huntsville along the Birmingham Valley, stopping at the major springs to rest and drink clean water. During most of the 1800s, the county's main industry was agriculture, with cotton serving as the primary cash crop. In the late 1800s, the mining of coal and iron led to the establishment and rapid growth of the city of Birmingham. By the early 1900s, most of the agricultural land in the area had been transformed to urban land, while surface mining remained as a major land use. As the coal sources were depleted, many of the small towns created by the mining boom disappeared.

SOCIOECONOMIC ENVIRONMENT

In 2003, the city of Bessemer, Alabama, had an estimated population of 29,108 persons, with the majority of the population being of African American descent (69.6 percent). Educational levels in the Bessemer area are moderate, with about three-fourths of the population, age 25 and older, having received a high school diploma or equivalent (67.4 percent); however, of those with a high school education, only 9.2 percent have some form of college degree.

In comparison with the State of Alabama and the United States, income levels of persons living in Bessemer are low. The per capita income of the area, at \$12,232, is only 57 percent of that of the United States, at \$21,587, and 67 percent of that of the State of Alabama, at \$18,189. Likewise, the median household income is at \$23,066, is 55 percent of that of the nation, at \$41,994 and 68 percent of the state's, at \$34,135. Unemployment is high with 27.2 percent of the population below the poverty level (U.S. Census Bureau 2000). See Table 2 for a comparison of geographic and demographic statistics for the city of Bessemer, Jefferson County, Alabama, and the United States of America.

OUTDOOR RECREATION ECONOMICS

The fish and wildlife of Alabama are economically important (Table 3). According to the report, *Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation*, approximately 34.8 million people visited national wildlife refuges in fiscal year 2006, generating almost \$1.7 billion in total economic activity and creating almost 27,000 private sector jobs producing about \$542.8 million in employment income (Carver and Caudill 2007). Additionally, recreational spending on refuges generated nearly \$185.3 million in tax revenue at the local, county, and state, and federal levels (Carver and Caudill 2007). As the number of visitors grows, significant economic benefits are realized by local communities. In 2006, nearly 71 million people, 16 years and older, fished, hunted, or observed wildlife spending \$45.7 billion and generating \$122.6 billion (Leonard 2008).

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, Watercress Darter NWR serves an important role, not only by providing habitat for a diversity of plant and wildlife species, but also as a place where people can go to enjoy these resources.

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. It can benefit the community directly by providing recreational and employment opportunities for the local population and indirectly by attracting tourists from outside the area to generate additional dollars for the local economy.

Table 2. Comparison of geographic and demographic statistics for the city of Bessemer, Jefferson County, Alabama, and the USA

| Area | Land Area (sq. miles) | Population (2005 estimate) | Pop. Density (residents per sq. mile) | % pop. change (2000-2005) | Per capita income (1999 est.) | % below poverty (2003 est.) | % White (2005 est.) | % Black (2005 est.) | % Hispanic (2005 est.) | % Asian (2005 est.) | % Native American (2005 est.) |
|-------------------------|-----------------------|----------------------------|---------------------------------------|---------------------------|-------------------------------|-----------------------------|---------------------|---------------------|------------------------|---------------------|-------------------------------|
| City of Bessemer | 41 | 29,108* | 729 | -2.0 | \$12,232 | 14.4 | 28.9 | 69.6 | 1.1 | 0.2 | 0.3 |
| Jefferson County | 1,112 | 657,229 | 595 | -0.7 | \$20,892 | 14.4 | 54.7 | 41.2 | 2.3 | 1.0 | 0.2 |
| Alabama | 50,744 | 4,557,808 | 88 | 2.5 | \$18,189 | 15.2 | 71.1 | 26.4 | 2.3 | 0.8 | 0.5 |
| USA | 3,537,438 | 296,410,404 | 80 | 5.3 | \$21,587 | 12.4 | 66.9 | 12.8 | 14.4 | 4.3 | 1.0 |

*ESTIMATE FOR 2003
Sources: U.S. Census Bureau 2000

Table 3. 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

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.

REFUGE ADMINISTRATION AND MANAGEMENT

LAND PROTECTION AND CONSERVATION

The refuge was established on October 1, 1980, when 7.1 acres were acquired in fee title at Thomas Spring. In 1983, a second pond was constructed on the refuge to provide additional habitat for the watercress darter. Although no land has been acquired at Glenn Springs, habitat protection efforts were undertaken in cooperation with the previous landowner at that site. The death of the previous owner and lack of any formal protection agreement has led to Glenn Springs again being unprotected. An expansion of 30 additional acres (2 acres at Thomas Spring and 28 acres at Roebuck Springs) was approved on March 9, 1995. In 2001, the refuge was expanded again to include an additional 16 acres adjacent to Thomas Spring. The approved acquisition boundary consists of 28 acres at Roebuck Springs, 25 acres at Thomas Spring, and 1 acre at Glenn Springs. Currently, the Service owns, in fee title, a total of 24.52 acres at Thomas Spring and none at Glenn Springs or Roebuck Springs.

Land acquisition continues to be a priority as there are still 28 acres of inholdings within the 53-acre established acquisition boundary for Watercress Darter NWR. Lands will continue to be purchased when and if there are any willing sellers and funds are available. Priority of acquisition would first be focused on attempting to acquire the 1-acre Glenn Springs parcel followed by the 27 acres that make up Roebuck Springs. The refuge staff is currently evaluating the expansion of Watercress Darter NWR to include recharge areas and sites with new populations.

VISITOR SERVICES

The refuge is open to the public. However, public use opportunities are limited due to the small size of the refuge and the presence of the federally listed watercress darter. Limited hiking, wildlife observation, and wildlife photography opportunities are available. The refuge is open daily, dawn to dusk (year-round), and there are no entrance fees. In 2006, an estimated 3,000 persons visited the refuge.

PERSONNEL, OPERATIONS, AND MAINTENANCE

The refuge is currently un-staffed but managed from a distance by the staff at Mountain Longleaf NWR. Biological and public use reviews and the CCP planning team identified the need for additional staff.

Funding

Each year Mountain Longleaf NWR receives its own specific budget. Management actions on Watercress Darter NWR, except special project-specific monies, are normally funded from within the Mountain Longleaf NWR budget. No additional monies are directed for use on Watercress Darter NWR.

Facilities

Currently, the only facility located at Watercress Darter NWR is a one-story residence that is currently occupied by a volunteer to provide oversight and security for the refuge.

Interior Roads, Trails

The refuge has a short hiking trail. Trail facilities include a 6-car parking area, single panel kiosk, a boardwalk, and overlook near the man-made pond. There are no interior roads.

Refuge Revenue Sharing

By law, Watercress Darter NWR is exempt from paying property taxes, and instead makes in lieu of payments to Jefferson County through the Refuge Revenue Sharing Act established by Congress (Table 4). 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 4. Watercress Darter NWR revenue payments in dollars for Jefferson County, Alabama, for a 10-year period

| Fiscal Year | Jefferson County |
|-------------|------------------|
| 2007 | \$347 |
| 2006 | \$359 |
| 2005 | \$388 |
| 2004 | \$344 |
| 2003 | \$389 |
| 2002 | \$134 |
| 2001 | \$530 |
| 2000 | \$604 |
| 1999 | \$649 |
| 1998 | \$689 |
| 1997 | \$114 |

III. Plan Development

OVERVIEW

In accordance with Service guidelines and National Environmental Policy Act recommendations, public involvement has been a crucial factor throughout the development of the CCP for Watercress Darter NWR. This CCP has been written with input and assistance from interested citizens, conservation organizations, and employees of local, state, and federal agencies. The participation of these stakeholders and their ideas has been of great value in setting the management direction for Watercress Darter NWR. The Service, as a whole, and the refuge staff, in particular, are very grateful to each one who has contributed time, expertise, and ideas to the planning process. The staff remains impressed by the passion and commitment of so many individuals for the lands and waters administered by the refuge.

The first step in developing a CCP for the refuge was a Biological Review that took place from September 16-20, 2002. A diverse team of federal, state, and conservation organization personnel undertook a holistic examination of habitat and wildlife management programs at the refuge. The team then considered how the refuge might fit into accomplishing a number of relevant system-wide and landscape conservation needs. The Biological Review team included staff from the refuge as well as Service biologists from the Division of Ecological Services, Division of Migratory Birds, and Division of Refuges. In addition, wildlife and fisheries biologists from the ADWFF participated. The team's recommendations set forth in its final report, *Wildlife and Habitat (Biological) Review for Wheeler NWR Complex*, were instrumental in developing the goals, objectives, and strategies found in this document.

The next step in the CCP process was a Visitor Services Review in August 2007, carried out by Service public use and outreach specialists. The review team toured the refuge, identified and discussed the current status of public use programs, and debated the pros and cons of various recommendations for enhancing and improving these programs over the coming 10-15 years. These recommendations were taken into consideration during the development of the CCP.

A Core Planning Team consisting of the refuge manager, assistant refuge manager, refuge biologist, and a refuge planner was formed to prepare the CCP. This team met in early 2007 for a tour of the refuge and an overview of its habitat and wildlife resources and public use programs, facilities, and opportunities. The core team also conducted additional internal scoping and prepared a preliminary schedule and plans for public involvement.

A multi-agency planning team was formed and met for the first time on March 21, 2007. This team consisted of personnel from Watercress Darter and Wheeler NWRs, the Service's Regional Office, ADWFF, and the University of Alabama.

A notice of intent to prepare the comprehensive conservation plan was published in the *Federal Register* on March 6, 2007. Public scoping consisted of a mail-out on April 4, 2007 of summary sheets and comment forms to over 150 agencies, organizations, and individuals. Recipients had the opportunity to address concerns about the refuge and offer suggestions for how it should be managed in the future. Comments could either be mailed or sent via e-mail.

SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

The planning team identified a number of issues, concerns, and opportunities related to protection and management of the refuge and the endangered watercress darter. Additionally, the planning team considered federal and state mandates, as well as applicable local ordinances, regulations, and plans. The team also directed the process of obtaining public input through planning team meetings, comment packets, and personal contacts. All public and advisory team comments were considered; however, some issues important to the public fell outside the scope of the decision to be made within the planning process. The team considered all issues which were raised during this planning process, and developed a plan that attempts to balance the competing opinions regarding important issues. The team identified those issues that, in the team's best professional judgment, are most significant to the refuge. A summary of the significant issues follows.

The significant issues are divided into five categories: Fish and Wildlife Population Management; Habitat Management; Resource Protection; Visitor Services; and Refuge Administration.

FISH AND WILDLIFE POPULATION MANAGEMENT

- Make needs of threatened and endangered species top priority.
- Conduct monitoring in a standardized manner that provides for population trend comparisons and determination of the effectiveness of habitat enhancement measures and the overall habitat quantity and quality trends.
- Compare population trends.
- Continue to investigate genetic differences between watercress darter populations.
- Restore habitats including streams below spring runs (Halls, Nabors, and Village Creeks).
- Consider habitat manipulation experiments to benefit wildlife.
- Coordinate recovery activities with Service's Jackson, Mississippi, Ecological Services Office.

HABITAT MANAGEMENT

- Conduct a baseline water analysis at Thomas, Glenn, and Roebuck Springs.
- Determine recharge area for Thomas, Glenn, and Roebuck Springs.
- Maintain sufficient water levels at Glenn Springs.
- Establish procedures to measure outflow, establish a baseline, and monitor the results.
- Control invasive exotic plants such as kudzu and Chinese privet.

RESOURCE PROTECTION

- Investigate a refuge boundary expansion to include Seven Springs.
- Investigate a refuge boundary expansion to include recharge areas, spring runs, and stream reaches adjacent to Thomas and Glenn Springs.
- Protect Glenn Springs and Roebuck Springs through fee title acquisition, easement, or lease.
- Work with conservation partners to develop a comprehensive watershed management plan that minimizes high flows from storm water runoff and the associated fine sediments and other pollutants.
- Conserve trees in riparian zones adjacent to watercress darter habitat (springs, spring runs, and creeks) and plant additional trees where needed.

VISITOR SERVICES

- Encourage local public use and support for the refuge.
- Increase opportunities for wildlife observation and wildlife photography.
- Increase emphasis on environmental education and interpretation to lead to increased understanding of the importance of habitat and resources, especially the watercress darter.

REFUGE ADMINISTRATION

- Add one position at Watercress Darter NWR and four positions to be shared with Cahaba River NWR.
- Continue and increase volunteer workers to assist with refuge.

Wilderness Review

Refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process. The results of the wilderness review are included in Appendix G.

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 Improvement Act is for the Service to maintain the ecological health, diversity, and integrity of refuges. Public uses are allowed if they are appropriate and compatible with wildlife and habitat conservation. The Service has identified six priority wildlife-dependent public uses (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation). All but hunting and fishing are emphasized in this CCP.

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

Three alternatives for managing the refuge were considered:

ALTERNATIVE A - MAINTAIN CURRENT MANAGEMENT (NO ACTION ALTERNATIVE)

ALTERNATIVE B - REFUGE FOCUSED MANAGEMENT

ALTERNATIVE C - INTEGRATED LANDSCAPE MANAGEMENT (PROPOSED ALTERNATIVE)

The Service chose Alternative C as the preferred management direction.

Implementing this CCP will result in the refuge lands being protected, maintained, restored, and enhanced for the endangered watercress darter, migratory birds, and resident wildlife. Extensive wildlife and plant census and inventory activities would be initiated to develop the baseline biological information needed to implement management programs on the refuge.

All management actions would be directed towards achieving the refuge's primary purposes including: (1) Protection of the watercress darter and its habitat; (2) providing habitat for a natural diversity of wildlife and plants; and (3) providing opportunity for compatible outdoor recreation, environmental education, and interpretation.

Threats to the refuge are becoming more prominent as development activities occur in the city of Bessemer. Watercress Darter NWR is a small system that can be greatly compromised by activities a distance away from its boundary. The staff will continue current activities and extend beyond the immediate neighbors to address issues associated with the aquifer and spring recharge area, watershed, and biota exchange pathways. Extensive resource sharing and networking with other protected areas, state agencies, local governments, non-governmental organizations, specialists, researchers, and private citizens will expand the knowledge base and develop cooperation between interest groups. Restoration of natural systems, native communities, and healthy environments will be emphasized thus promoting regionally a high quality of wildlife, fish, and habitats. Monitoring environmental parameters, flora, and fauna will be incorporated into an integrated study to gain knowledge on the health of the refuge ecosystem. Education and outreach will be expanded with an emphasis on cultural and historical resources including groundwater and springs. Staffing will be developed to meet the needs of partners and the greater number of interest groups, and accommodate data and resource sharing. An increase in

staff is presented in this alternative so that Watercress Darter NWR can be managed with a greater emphasis on landscape management. Additional staff members needed to implement this alternative at the highest quality level include one position at Watercress Darter NWR and four positions shared between Cahaba River NWR and Watercress Darter NWR.

VISION

The watercress darter is found in only five springs within the Black Warrior River Watershed in Jefferson County, Alabama. The very limited distribution of this species in freshwater spring habitats makes it highly vulnerable to threats. In 1980, Watercress Darter NWR was established to provide protection for the watercress darter and to conserve and restore crucial habitat. The refuge, located within the city of Bessemer, contains, protects, and manages Thomas Spring, one of the few naturally occurring springs where the watercress darter occurs. In addition, the approved refuge acquisition boundary contains Roebuck Springs, owned by the state and city of Birmingham, and Glenn Springs, privately owned. Refuge staff, working with partners, will focus on efforts to restore, enhance, and maintain habitat vital to the survival of the watercress darter. Other species, such as migratory birds, will also benefit from refuge habitat conservation and restoration. The refuge will be managed to be a true oasis of protected habitat within an urban area of increasing development. When compatible, wildlife-dependent recreational opportunities, such as wildlife observation, wildlife photography, and environmental education and interpretation, will be provided, while promoting the public's understanding of the purposes of the refuge and the mission of the 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. Projects associated with the various strategies can be found in Chapter V.

These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the Improvement Act, the mission of the Refuge System, and the purposes and vision of Watercress Darter NWR. With adequate staffing and funding as outlined in Chapter V, the Service intends to accomplish these goals, objectives, and strategies within the next 15 years.

FISH AND WILDLIFE POPULATION MANAGEMENT

Goal 1. Protect, maintain, enhance, and restore healthy and viable populations of all federal and state threatened/endangered species and other species of management concern found on the refuge in a manner that supports national and international treaties, plans, and initiatives.

Discussion: The watercress darter (*Etheostoma nuchale*) is known to occur naturally in habitat associated with four limestone springs; Glenn, Thomas, Seven, and Roebuck, all of which are located in Jefferson County, Alabama. The population at Glenn Springs was first collected in 1964. Additional field work located the remaining three known populations: Thomas, Roebuck, and Seven Springs. In 1970, the Service officially recognized the watercress darter as an endangered species. Watercress Darter NWR was established by the Service in 1980, to provide protection for the watercress darter and to conserve and restore its crucial habitat. Today, the 25-acre refuge consists of two spring-fed ponds, several stands of mixed pine-hardwoods with shrubs, and a single residence. It also contains Thomas Spring, a one-quarter-acre pond where a population of watercress darters was found in 1976. A second pond was constructed on the refuge in 1983 by the Service to provide additional habitat for the darter.

Objective 1.1: Within 3 years, develop and implement a consistent population monitoring plan for the watercress darter on the refuge based on scientific protocol and the “Action Items” contained in the Watercress Darter Recovery Plan.

Discussion: The very limited distribution of watercress darters makes them highly vulnerable to threats. The likelihood of its survival can be enhanced by providing for early detection of threats to occupied habitat and groundwater and spring recharge areas. Monitoring should be done in a standardized manner that provides for population trend comparisons and determination of the effectiveness of habitat enhancement measures and the overall habitat quantity and quality trends.

Strategies:

- Monitor watercress darter populations in conjunction with academic institutions and other partners consistent with the Recovery Plan.
- Visually inspect watercress darter habitat periodically to detect potential disturbances from surrounding land uses.
- Monitor invasive aquatic fauna.
- Monitor ground water at spring head yearly for contaminants, bacteria, and flow levels using an approved protocol.

Objective 1.2: Within 3 years, determine population dynamics of watercress darter at Thomas Spring, including age and sex structure, recruitment, larval ecology, and other parameters. Determine the genetic distinctness, similarities, and diversity with watercress darter on the refuge.

Discussion: Natural populations of watercress darter from Glenn and Thomas Springs are divergent from the populations at Roebuck and Seven Springs. Initial genetic testing indicates that these populations differ in allele frequency and composition and also suggests that biochemical variation between these two isolated populations of watercress darter may place them within separate evolutionary significant units.

Strategies:

- Determine larval ecology in a laboratory setting.
- Seek assistance from academic institutions to conduct seasonal sampling of watercress darter populations to determine sex ratios, age structure, population estimates, and other parameters.
- Encourage academic institutions to use the latest genetic technology to determine the genetic structure of watercress darters at Thomas Spring and explore how this relates to watercress darter populations at the three other watercress darter springs.

HABITAT MANAGEMENT

Goal 2: Protect, maintain, enhance, and restore native habitat on the refuge with special emphasis on habitat for watercress darter.

Discussion: The watercress darter thrives in deeper, slow-moving backwaters of springs that contain thick aquatic vegetation such as *Nasturtium*, *Chara*, *Fontinalis*, and *Spirogyra*. Indications of water quality or quantity problems have been noted on the refuge.

Objective 2.1: In conjunction with partners, over the life of the CCP, monitor contaminants present and determine ways to reduce the impact of these on the watercress darter habitat.

Discussion: The aquifers in Jefferson County around the refuge are generally susceptible to contamination from the surface. Where sinkholes are present, the aquifer may be extremely susceptible to surface contamination because there is a direct link to the aquifer.

Strategies:

- Monitor ground water quality periodically at Thomas Spring.
- If contaminants are present, determine the source.
- Determine if increasing the sunlight to the spring pool will increase desirable aquatic plants conducive to watercress darters.

Objective 2.2: Determine the recharge area for Thomas Spring.

Discussion: The aquifer recharge area for Thomas Spring is vulnerable to contamination from the land surface (Kopaska-Merkel, et al. 2005). Specifically, water quality of the aquifer is vulnerable to point source and non-point source pollution, urbanization, and changes in watershed geomorphology. Non-point source pollution from land surface runoff can originate from virtually any land use activity and include sediments, fertilizers, herbicides, pesticides, animal wastes, septic tank and gray water leakage, and petroleum products. These pollutants tend to increase concentrations of nutrients and toxins in groundwater and alter water quality chemistry. Construction and road maintenance activities associated with urban development typically involve earth moving activities that increase sediment loads into nearby streams. These and other sedimentation sources, including timber harvesting, clearing of riparian vegetation, and mining and agricultural practices, allow exposed earth to enter streams during or after precipitation events and may enter into the groundwater. Groundwater quantity can be affected by paving, stormwater systems, rooftops or other impervious surfaces which cause “hardening” of recharge areas and the loss of this water as a source for groundwater recharge.

Strategy:

- Use dye markers in existing wells or drill into aquifer to allow injection of appropriate dye tracers

Objective 2.3: Over the life of the CCP, control exotic, invasive flora on the refuge.

Discussion: Invasive plant species that are problematic on Watercress Darter NWR are numerous and include kudzu and Chinese privet.

Strategies:

- Mow and spot treat kudzu with approved herbicides.
- Hack and spray privet with approved herbicides.

RESOURCE PROTECTION

Goal 3: Identify and conserve natural and cultural resources on the refuge and promote conservation through interagency and private landowner cooperation, partnerships, and land protection programs in the Black Warrior River Watershed.

Discussion: Resource protection issues include acquiring or otherwise managing inholdings, identifying and protecting any cultural resource sites, and providing sufficient law enforcement.

Objective: 3.1: Protect recharge areas at Glenn and Thomas Springs.

Discussion: The aquifer recharge area for Glenn and Thomas Springs is vulnerable to contamination from the land surface. Specifically, the water quality of the aquifer is vulnerable to point source and non-point source pollution, urbanization, and changes in watershed geomorphology. Non-point source pollution from land surface runoff can originate from virtually any land use activity and include sediments, fertilizers, herbicides, pesticides, animal wastes, septic tank and gray water leakage, and petroleum products. These pollutants tend to increase concentrations of nutrients and toxins in groundwater and alter water quality chemistry. Construction and road maintenance activities associated with urban development typically involve earth moving activities that increase sediment loads into nearby streams. These and other sedimentation sources including timber harvesting, clearing of riparian vegetation, and mining and agricultural practices allow exposed earth to enter streams during or after precipitation events and may enter into the groundwater. Groundwater quantity can be affected by paving, storm water systems, rooftops, or other “hardening” of recharge areas.

Strategies:

- Maximize recharge retention quantities.
- Minimize impervious surface areas.
- Reduce storm water runoff.

Objective 3.2: Over the life of the CCP, protect Glenn and Thomas Springs.

Discussion: Threats from urbanization of the spring recharge areas are severe and escalating. Widening and maintaining Fourth Avenue and the construction of a stormwater system in 2001, within 50 feet of Glenn Springs, have altered the spring run and spring pool (D. Drennen, pers. obs.). Traffic is vigorous along Fourth Avenue and is conducive to vehicle accidents and toxic spills. Construction and urbanization on the hill above the spring head continues, in addition to increased road and maintenance activities along the west boundary. Because the main microhabitat for the watercress darter in streams is root masses from trees (mostly Sycamores), the extant riparian zone along the unnamed tributary to Halls Creek should be conserved and additional trees should be planted in areas lacking proper riparian zones. Restoration of habitat in the unnamed tributary to Halls Creek and of the spring runs could eventually restore natural connectivity between watercress darter populations in Thomas and Glenn Springs (Fluker et al. 2008). At Glenn Springs, the continued ownership and protection of the spring head, spring run, and immediate recharge area is in jeopardy due to the death of the landowner and unknown intentions of the heirs. Unsuccessful attempts since 2001 have been made to purchase the property by the Black Warrior-Cahaba River Land Trust.

Strategies:

- Acquire Glenn Springs or negotiate a long-term easement or lease.
- Construct barriers to direct roadway spills away from spring-heads and ponds.
- Install retention basins to lessen high flows in stream reaches and promote stream bed stability and growth of aquatic vascular plants.
- Plant trees along the riparian zone between Glenn and Thomas Springs and downstream of Glenn Spring Run.
- Evaluate the refuge boundary for fire protection.

Objective: 3.3: Continue to encourage and support the protection of Roebuck Springs.

Discussion: Roebuck Springs is located on the campus of the Jefferson County Youth Services Facility at 8950 Roebuck Boulevard in Birmingham. The spring pool and run is within 200 feet of Roebuck Boulevard to the south, the school facility grounds is to the north, with Roebuck Springs Golf Course and park grounds to the west and east. There are many parking lots and small driveways and connecting streets within the area. Interstate 59 and Highway 11 are less than 0.25-mile to the south. In the 1970s, construction of Interstate 59, just south of the spring pool, destroyed two spring heads of the Roebuck Springs system (Drennen, USFWS, unpublished data). The extent of the negative impacts caused by this destruction to the springs' hydrology is unknown. Additionally, Magic Screwdriver Cave, located in a residential area less than 0.5-mile south of Roebuck Springs, is interconnected hydrologically with the Roebuck Springs system (Hearn 1993), and since 1983, the condition of the groundwater within the cave has declined (S. Spencer, pers. comm.). The Jefferson County Youth Services Facility staff actively protects the water quality of the spring pool and spring run by establishing buffer zones and limiting the use of herbicides and entry into the area. Threats occur from adjacent private and public areas such as the indiscriminate use of pesticides on the Roebuck Springs Golf Course, sedimentation caused by construction and maintenance of roadways, storm water runoff, and other sources. Historically, the spring pool has had high levels of *E. coli* bacteria (U.S. Department of the Interior 1979) and polycyclic aromatic hydrocarbons levels were high and suspected as harmful to the watercress darter (USFWS 1991). Traffic is dynamic along all roadways mentioned and is conducive to vehicle accidents and toxic spills. Even though the Jefferson County Youth Services Facility land is well-protected, maintained, and monitored, the spring head and spring run is threatened by adjacent urbanization, industry, construction, road maintenance, and storm water events. There are unknown impacts to the aquifer that supplies the spring.

Strategies:

- Coordinate with local partners to minimize accidental spills from hazardous materials and install spill containment equipment.
- Support Ecological Services in efforts to eliminate storm water runoff into spring and spring-run.
- Provide logistic support in placement of signs "No fishing, swimming, dumping, or release of aquatic organisms."
- Determine recharge area for Roebuck Spring.

Objective: 3.4: Investigate a refuge boundary expansion to include Seven Springs and the recharge areas, spring runs, and stream reaches adjacent to Thomas, Glenn, and Seven Springs.

Discussion: Researchers have recently found that a permanent population of watercress darters is occupying the stream for over 100 m below the outflow from Glenn Springs (unnamed tributary to Halls Creek) and specimens have been found in Nabors Branch below the outflow of Seven Springs. Watercress darters are also found in spring runs and stream reaches below Thomas Spring.

Strategies:

- Prepare a Major Expansion Proposal for Watercress Darter NWR.
- Establish easements and/or Memorandums of Understanding regarding landowners and businesses adjacent to the refuge and along the Halls and Nabors Creek system.

Objective 3.5: Increase law enforcement presence on the refuge.

Discussion: At present, the refuge has no law enforcement personnel. The refuge affords limited public access, no consumptive use, and is located within the city of Bessemer. The typical areas of concern include trespass, fishing, trash/refuse dumping, stray pets, vandalism, encroachment, arson-caused wildfires, and dumping of bait fish or aquarium biota into the spring system.

Strategies:

- Add refuge officer to the central Alabama portion of the refuge complex (Watercress Darter, Cahaba River, and Mountain Longleaf NWR), with a portion of his/her duties being Watercress Darter NWR.
- Continue to cooperate with state and local police jurisdictions.
- Make efforts to prevent bait fish and aquarium biota introductions on the refuge.

Objective 3.6: Within 1 year of the date of this CCP, coordinate power line right-of-way maintenance with Alabama Power Company.

Discussion: An Alabama Power Company line right-of-way crosses the refuge and extends directly over the constructed pond. In 2003, the company sprayed this right-of-way, which could have resulted in herbicides being introduced into Thomas Spring. In 2007, the company mowed the right-of-way. A long-term strategy for maintaining the right-of-way is needed to ensure that spraying does not occur again.

Strategy:

- Meet with Alabama Power Company to make sure that its maintenance plan specifies no spraying on the refuge.

Objective 3.7: Within 15 years of the date of this CCP, develop and begin to implement a Cultural Resources Management Plan.

Discussion: The refuge follows standard National Historic Preservation Act Section 106 procedures to protect the public's interest in preserving its cultural/historic legacy that may potentially occur on the refuge. If any construction work is undertaken that involves any excavation with heavy earth-moving equipment, such as tractors, graders, and bulldozers, the refuge would contract with a qualified archaeologist/cultural resources expert to conduct an archaeological survey of the subject property. The results of this survey would be submitted to the Service's Regional Archaeologist, as well as Alabama's State Historic Preservation Office. The State Historic Preservation Office 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 State Historic Preservation Office immediately. To date, no properties on the refuge have been determined to be eligible for the National Register of Historic Places.

Strategies:

- Within 10 years of the date of this CCP, conduct a Phase I archaeological survey of the non-flooded areas of the refuge, by qualified personnel, as a necessary first step in cultural resources management.

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- Conduct a Phase II investigation if archaeological resources are identified during the Phase I survey. In this, the eligibility of identified resources for listing on the National Register of Historic Places is evaluated prior to any disturbance.
 - Conduct a Phase III data recovery if resources identified in Phases I and II are determined to be eligible. This will recover data and mitigate adverse effects of any undertaking.
 - Within 15 years of the date of this CCP, prepare a Cultural Resources Management Plan for the refuge.
 - Follow procedures outlined in Cultural Resources Management Plan for consultation with the State Historic Preservation Office, and potentially interested American Indian tribes.
 - Follow procedures detailed in Cultural Resources Management Plan for inadvertent discoveries of human remains.
 - Ensure that archaeological and cultural values are described, identified, and taken into consideration prior to implementing undertakings.
 - Develop a step-down plan for surveying lands to identify archaeological resources and for developing a preservation program.
 - Continue to partner with Southwest Jefferson County Historical Society.

VISITOR SERVICES

Goal 4: Promote awareness and appreciation within the local community and among refuge visitors of the unique values of Watercress Darter NWR and the Refuge System.

Discussion: Currently, the refuge's public use and visitation programs are limited to wildlife observation along one nature trail with an interpretive kiosk. Other priority public uses encouraged at national wildlife refuges are wildlife photography and environmental education and interpretation.

Objective: 4.1: Within 5 years of CCP approval, develop a Visitor Services Plan to be used in expanding public use facilities and opportunities on the refuge.

Discussion: The refuge will develop a Visitor Services Plan. Issues related to refuge management will be addressed in this step-down plan. Current and future staffing needed to implement the recommendations within this CCP will also be addressed.

Strategy:

- Obtain the assistance of public use and recreation specialists in the Regional Office and throughout the Region in preparing a Visitor Services Plan that reflects current legislation, Director's orders, initiatives, policies, and the missions of the refuge, the Refuge System, and the Service.

Objective: 4.2: Over the 15-year life of this CCP, increase opportunities for wildlife observation and wildlife photography.

Discussion: The refuge has a short hiking trail. Trail facilities include a 6-car parking area, single panel kiosk, a boardwalk, and an overlook near the man-made pond. It is possible to view the darter habitat from this location but not the darter itself. Traffic sights and sounds from Division Street are noticeable. A private non-profit group has plans to develop the vacant property, immediately across from Thomas Spring, into a cultural/music center. There is an historic site maintained by the West Jefferson County Historical Society and their volunteers located between the trail and the refuge residence.

Strategies:

- Continue a relationship with West Jefferson County Historical Society and the Birmingham Audubon Society to help manage a volunteer program and maintain both properties, eradicate invasive species, and train volunteers to maintain the site and provide occasional tours.
- Determine an annual schedule for when the refuge staff can offer volunteer training and clean-up days. Communicate this information to the public, so that people can be recruited well in advance.
- Prepare a list of volunteer opportunities, develop job descriptions, and recruit volunteers to perform these jobs.
- Provide information to the public regarding scheduled fish sampling on the refuge.
- Identify the refuge on a sign. Add a panel on the back of the trailhead kiosk (Watercress Darter NWR, Thomas Spring Trail) to be viewed from Eastern Valley Road.
- Complete installation of boundary signs along the northern boundary of this property.
- Evaluate the need for “early warning” directional signs (Trail 100 feet ahead) on Eastern Valley Road and if appropriate, add directional signs leading motorists to the Thomas Spring trailhead.
- Add an interpretive panel along the trail, explaining eradication efforts and problems associated with kudzu, privet, and other invasive plants.
- Increase the level of maintenance (eradicate kudzu and privet, increase litter removal) at the trailhead parking area. Remove the privet between the kiosk and road, so that motorists can see the front of the sign.
- Work with Audubon Society and other organizations, such as local garden clubs, to provide volunteers to lead at least two regularly scheduled outdoor educational tours annually. These walks could coincide with other scheduled trips offered at Mountain Longleaf and Cahaba River NWRs.

Objective 4.3: Over the 15-year life of this CCP, increase emphasis on environmental education and interpretation to increase understanding of the importance of refuge habitats and resources, especially watercress darter.

Discussion: On-site environmental education will include staff or volunteer-led walks on the nature trail and discussions on watercress darter life history. Off-site environmental education will include: presentations to schools, garden clubs, and organizations and participation in special events like Earth Day and National Wildlife Refuge Week.

Refuge staff or volunteers occasionally will host school groups at the refuge. In addition, the staff will participate at schools, clubs, groups, and festivals, speaking about the refuge, wildlife resources, and environmental issues.

The refuge's main interpretive theme is endangered species. The refuge contains one of only five springs where endangered watercress darters are found.

Strategies:

- Develop interpretive signs for the refuge trail.
- Work to have a local group adopt the trail and maintain it.
- Develop environmental education materials for endangered species and other important education topics for the refuge.
- Develop a PowerPoint exhibit that outlines the life history of watercress darter and its endangered status.
- Develop a general brochure with information about the refuge, including a map and other revised information. Include the new trail, wildlife viewing opportunities (by month), and volunteer opportunities.

REFUGE ADMINISTRATION

Goal 5: Develop and implement a comprehensive refuge program, including providing sufficient staff, facilities, equipment, and volunteers to protect and manage natural, cultural, and historical resources and features that define the refuge.

Discussion: Watercress Darter NWR is part of the central Alabama portion of the Wheeler NWR Complex. The other refuges within this complex are Mountain Longleaf; Cahaba River (central Alabama); and Key Cave, Sauta Cave, Fern Cave, and Wheeler (northern Alabama). Watercress Darter NWR is currently un-staffed and managed from Mountain Longleaf NWR.

Objective 5.1: Within the 15-year life of this CCP, obtain five additional staff (one position at Watercress Darter NWR and four positions to be shared between Cahaba River NWR) and the resources needed to accomplish all of the outlined comprehensive management goals and objectives.

Discussion: Currently, Mountain Longleaf NWR has a staff of two with management responsibilities at three refuges (Mountain Longleaf, Cahaba River, and Watercress Darter). To implement this CCP and accomplish the vision, goals, and objectives identified, additional resources will be needed. Staff positions within the refuge complex will need to be increased by five full-time positions, with priority focused on resource protection and habitat management.

Strategies:

- Hire a refuge operations specialist for Watercress Darter NWR.
- Hire a biologist for Cahaba River NWR with management responsibilities also at Watercress Darter NWR.
- Hire an outdoor recreation planner for Cahaba NWR with responsibilities also at Watercress Darter NWR.
- Hire a law enforcement officer for Cahaba NWR with responsibilities also at Watercress Darter NWR.
- Hire an equipment operator for Cahaba NWR with management responsibilities also at Watercress Darter NWR.

V. Plan Implementation

INTRODUCTION

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

To accomplish the purpose, vision, goals, and objectives contained in this CCP for Watercress Darter NWR, 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 associated costs for fish and wildlife population management, habitat management, resource protection, visitor services, and refuge administration over the next 15 years. This proposed project list reflects the priority needs identified by the public, planning team, and complex staff based upon available information. These projects were generated for the purpose of achieving the objectives and strategies for Watercress Darter NWR.

FISH AND WILDLIFE POPULATION MANAGEMENT

Project 1: Increase Control of Invasive Species

Controlling invasive and nuisance animal species is a priority of the Watercress Darter NWR. Some of the more problematic species, such as beaver, have caused damage to important wildlife habitats or species. If not controlled, they will continue to destroy habitat at a rapid pace. The project is designed to supplement current management practices already underway or currently funded.

Project 1A: Beaver Management

This project would provide funding for developing a beaver management program. Beavers are seriously impacting water control infrastructures, periodically flooding an adjacent road, and altering water quality at Watercress Darter NWR. The program would include modification of water control structures and possible relocation/removal of nuisance beaver from the refuge. The estimated first-year cost for this project is \$5,000, with a possible recurring cost of \$2,000.

Project 2: Increase Inventorying, Surveying, and Monitoring of Plant and Animal Populations

Inventorying, surveying, and monitoring of plant and animal populations are needed to ensure the biological integrity of refuge lands is maintained. This information is critical for developing habitat management plans that will influence all other management activities.

Project 2A: Determine the Recharge Area of Thomas Spring to Protect the Water Supply of Watercress Darter NWR – RONS # FY08-2931

Project 2A would focus on determining the recharge area of Thomas Spring to protect the water supply of Watercress Darter NWR. One of the greatest threats to Watercress Darter NWR and the federally endangered watercress darter is contamination of the groundwater that feeds the spring. Information gathered from this study would allow the refuge to work cooperatively with adjacent landowners to protect the water quality of Thomas Spring. Information from this study would also allow the refuge to assess the degree of threat and determine if additional lands need formal protection. The estimated first-year cost for this project is \$75,000, with a recurring cost of \$5,000.

Project 2B: Monitor Watercress Darter Populations and Water Quality – RONS # FY08-2937

Project 2B would facilitate monitoring of watercress darter populations at Watercress Darter NWR and throughout the refuge acquisition boundary. Annual monitoring of watercress darter populations and the water quality associated with the spring pools and runs where the fish are found are imperative for the continued survival of this species. The Watercress Darter Recovery Plan outlines this as an annual need for all populations of watercress darters. Through this project, we would determine population dynamics of watercress darter at Thomas Spring, including age and sex structure, recruitment, larval ecology, and other parameters. We would determine the genetic distinctness, similarities, and problems with watercress darter on the refuge. By monitoring the water quality of watercress darter habitats, we would enhance the likelihood of the watercress darter's survival by providing for early detection of threats. The estimated first-year cost for this project is \$45,000, with a recurring cost of \$15,000.

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

Watercress Darter NWR was established to conserve and protect the endangered watercress darter. The refuge is currently un-staffed and is managed by Mountain Longleaf NWR. Basic biological information is lacking about species found on the refuge and an individual staff member would greatly enhance conservation and protection efforts.

Project 3A: Improve Refuge Operations and Enhance Partnerships – RONS # FY08-2613

Project 3A would improve refuge operations and enhance partnerships of Watercress Darter NWR. The refuge is an urban refuge that protects one of only five sites known for the federally endangered watercress darter. The refuge's location within an urban setting leads to many management issues related to public use, volunteer coordination, trespass, vandalism, litter, and encroachment. A refuge operations specialist would lead day-to-day outreach, law enforcement, planning, operations, and maintenance programs. A refuge operation specialist would also attend to issues/threats, provide a greater degree of safety and protection to the visiting public and develop needed partnerships with adjacent landowners, businesses, nonprofit organizations, and government agencies. The estimated first-year and recurring costs for this project are \$94,588.

Project 3B: Manage Endangered Species and other Rare Wildlife by Establishing a New Biologist Position – RONS # FY08-2363 Cahaba River NWR

Project 3B provides funds for the hiring of a wildlife biologist at Cahaba River NWR, with responsibilities at Watercress Darter NWR, to help ensure the conservation, protection, and recovery of federally listed species. A wildlife biologist is needed to conduct research, inventory and monitor the many federally listed, candidate, and other species found within the boundary of the refuges to recommend/direct proper management decisions. A fish and wildlife biologist is critically needed as the refuges do not currently have a biologist. Biological information benefiting rare and declining

species within refuge upland and aquatic systems is not being obtained currently. The estimated first-year and recurring costs for this project are \$137,165.

HABITAT MANAGEMENT

Project 4: Increase Control of Invasive and Undesirable Plant Species

The biological integrity of refuge lands throughout the Watercress Darter NWR is threatened by a variety of invasive and undesirable plant species. The ability to control invasive plants is crucial in meeting objectives of local, state, and national conservation plans.

Project 4A: Implement Invasive Species Control and Native Habitat Restoration Program – FY08-3383

Project 4A would provide funding to develop and implement a refuge-wide invasive and exotic plant species program to control invasive, exotic, and undesirable plants on entire 25 acres of Watercress Darter NWR. The invasive species control program would use temporary staff to repeatedly treat areas, over a 4-year period, for Chinese privet, mimosa, kudzu, and other invasive species. Nearly 90 percent of the canopy and 50 percent of the ground cover is comprised of non-native and invasive species. Once controlled, annual spot treatments would be conducted by permanent staff as needed to prevent recolonization of sites from seed sources off the refuge and from dormant seeds within currently infested areas. Management actions needed include hand removal, herbicide application, site preparation, and native vegetation replanting in order to reduce the rate of spread and extent of invasive species and restore native flora. 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 for this project is \$138,133, with a recurring annual cost (for the remaining 3 years) of \$95,133.

Project 5: Improve Habitats at Watercress Darter NWR

Successful habitat management at Watercress Darter NWR is critical to the conservation and continued existence of the watercress darter, serving as one of only five areas known to contain populations of this highly endangered fish. Approval of the projects in this category would support habitat improvement such as restoring native upland communities. These actions would help improve water quality in the area to benefit the endangered species.

Project 5A: Restoration of Native Upland Communities – FY08-3383

A native habitat restoration program would be developed in conjunction with the implementation of the invasive species program. This project would focus on replanting restored areas with native upland species. By introducing native species into a treated landscape, the re-colonization of invasive species may be minimized or even halted. This project would be accomplished by temporary staff over a 4-year period. For estimated costs refer to Project 4A above.

RESOURCE PROTECTION

Project 6: Increase Law Enforcement Activities

Central Alabama refuges currently rely on one (1) zone law enforcement officer whose time is split covering the entire State of Alabama. Public use has continued to increase each year with issues requiring law enforcement, such as vandalism, compliance with access, public use regulations, and illegal harvesting aquatic species.

Project 6A: Ensure Safety of the Visiting Public and Protect Refuge Resources by Establishing Refuge Law Enforcement Officer – RONS FY08-2733 Cahaba River NWR

Project 6A would provide funds for hiring of a full-time law enforcement officer for the Cahaba River NWR, with added responsibility for Watercress Darter NWR, to ensure the safety of the visiting public and increase the protection of natural resources and facilities. Cahaba River NWR currently has no law enforcement officer stationed at the refuge and depends on officers from other refuges to provide occasional support and respond to incidents. The presence of a law enforcement officer providing surveillance and visitor contact is important for visitor safety and critical in reducing crime on the refuges. This level of protection is currently not available at either refuge. Both refuges were established to protect habitat for threatened and endangered species. The estimated first-year and recurring costs for this project are \$97,292.

Project 7: Increase Land/Water Conservation and Protection

The recovery of the watercress darter is dependent on a healthy aquatic ecosystem. Land conservation measures are critical tools for protecting and improving our water resources. Complex management supports both land and water conservation measures.

Project 7A: Protection of Aquatic Resources – New Project

The refuge would work to protect recharge areas of the springs known to be inhabited by the watercress darter in accordance with the recovery plan. The project would evaluate options for protection, including the possibility of expanding the refuge boundary. Long-term recovery of the species is dependent on habitat protection. By placing known sites in conservation status, the species has a higher probability of recovery. Costs associated with this project are based on variable property costs and therefore not stated.

Project 8: 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. This category would provide funding for research and for developing scientific reports that identify cultural resources located on the refuge. The project is essential in meeting federal cultural resource mandates.

Project 8A: Conduct a Archaeological Survey – New Project

The refuge would follow the National Historic Preservation Act Section 106 procedures in protecting cultural resources. Under this project, qualified personnel would develop a Cultural Resources Management Plan for the refuge in coordination with the Service policy. The project would progress in three phases: Phase 1 would involve an archaeological survey of the refuge. If significant cultural or archaeological resources are found, Phase 2 would further evaluate the sites/artifacts identified in Phase 1. Should these investigations enter Phase 3, this phase would develop recovery data on eligible sites/artifacts identified. The estimated timetable would be to accomplish Phase 1 of this project within the next 10 years and to develop the Cultural Resources Management Plan within 15 years.

VISITOR SERVICES

Project 9: Expand Visitor Services and Volunteer Capabilities

The Watercress Darter NWR is located in a mostly residential area within the city limits of Bessemer. This category provides an opportunity to expand and enhance the visitor services and volunteer capabilities of the refuge.

Project 9A: Expand Visitor Programs by Establishing an Outdoor Recreation Planner (Park Ranger) Position – RONS FY08-2582 Cahaba River NWR

The refuge currently lacks the capacity to develop opportunities for the public to enjoy the natural resources of the refuge. Connecting people with nature would facilitate the link between natural resources and clean water and air. Project 9A would provide funding to hire an outdoor recreation planner/park ranger to support expansion of public use activities at Cahaba River NWR with responsibilities at Watercress Darter NWR. Public use opportunities would be developed to fulfill requests for on- and off-site programs, including expanded community outreach and the growing volunteer program. The estimated first-year and recurring costs of this project are \$94,588.

Project 9B: Development of Visitor Services Plan

The Watercress Darter NWR is located in a mostly residential area within the city limits of Bessemer. The refuge was established almost 30 years ago, but only a small portion of local residents are aware of its existence. This project would focus on developing a step-down visitor services plan. The plan would create a comprehensive approach to connecting the public with nature. In addition, the plan would provide a system for monitoring and evaluating the effectiveness of the visitor services program annually.

Project 10: Expand Environmental Education and Wildlife Interpretation Programs

The main public use area on Watercress Darter NWR is a developed trail leading to one of two ponds. Projects in this category are designed to create an environmental education and wildlife interpretation program for the refuge by providing information to the local community about the watercress darter and the role the refuge plays in the recovery of an endangered species.

Project 10A: Develop an Outreach Program FY08-3388

Project 10A would develop an outreach program for Watercress Darter NWR targeting elementary school, high school, and adult audiences. A 4-year term park ranger will be utilized to develop outreach programs targeting segments of the local community, write the refuge's visitor services plan, and develop a refuge brochure. The outreach program will highlight the importance of conservation of watercress darter habitat in the urban settings where they are found. The refuge is an urban refuge that protects one of only five sites known for the federally endangered watercress darter. The refuge's location within an urban setting leads to many management issues related to trespass, vandalism, and litter that should improve with an effective outreach program. The estimated first-year cost for this project is \$115,456, with a recurring cost of \$55,456.

REFUGE ADMINISTRATION

Project 11: Improve Maintenance Programs, Facilities, and Road Systems

Watercress Darter NWR is managed by staff at Mountain Longleaf NWR located almost 100 miles away. The 2-person staff does not include a maintenance professional, as a result, adequate maintenance is not provided for existing infrastructure. Projects in this category are designed to improve maintenance programs, facility support, and trail system repairs throughout the refuge.

Project 11A: Improve Visitor Services by Paving 1,500 feet of Trail – SAMMS# 2007741915

Project 11 A would focus on enhancing visitor services. The Watercress Darter NWR has minimal development. Built in 2005, a 1,500-foot trail winds through the forested portion of the refuge, ending at a platform overlooking a pond. The trail requires constant maintenance. This project would use pervious materials to pave the trail in order to minimize recurring clearing of vegetation and to mitigate accessibility requirements. The estimated cost for this project is \$100,000.

Project 11B: Maintain Facilities and Grounds – RONS FY08-2500

Project 11B would provide funding to hire an equipment operator for Cahaba River NWR with maintenance responsibilities at Watercress Darter NWR. The facilities located on the refuge require continued maintenance, but would be sufficiently covered through a shared position stationed at Cahaba River NWR. The estimated first-year and recurring costs of this project is \$72,371.

FUNDING AND PERSONNEL

To complete the necessary wildlife habitat management and restoration projects and conduct the essential inventorying, monitoring, and mapping activities, more staff is required. Biological and public use review teams and the public identified the need for additional staff. The rate at which this refuge realizes its full potential to contribute locally, regionally, and nationally to wildlife conservation and appropriate wildlife-dependent recreation and environmental education is totally dependent upon receiving adequate staffing.

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 central Alabama area.

Mountain Longleaf NWR, Cahaba River NWR, and Watercress Darter NWR already cooperate with many organizations and individuals on important projects, including other agencies like the USDA Forest Service, Alabama Division of Wildlife and Fresh Water Fisheries, and non-governmental conservation groups such as The Nature Conservancy. In addition, the refuge has partnered with and will continue to partner with local police; nonprofit conservation organizations, such as the Audubon Society; and private individuals.

Successful partnerships will be essential for achieving the goals, objectives, and strategies set forth by this CCP. 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 Watercress Darter NWR will continue to seek creative partnership opportunities to achieve its vision for the future.

STEP-DOWN MANAGEMENT PLANS

A comprehensive conservation plan is a strategic plan that guides the future direction of a national wildlife refuge. A step-down management plan provides specific guidance on activities, such as habitat, fire, and visitor services management. Step-down plans (Table 5) are also developed in accordance with NEPA, 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 surveying, inventorying, and monitoring protocols will be adopted for the refuge. 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 or other appropriate partner participation. If monitoring and evaluating indicate undesirable effects for target and non-target species and/or communities, alterations to the management projects will be made, and the refuge's CCP will be revised. Specific monitoring and evaluation activities will be described in the step-down management plans.

PLAN REVIEW AND REVISION

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

Table 5. Watercress Darter NWR step-down management plans and associated completion dates

| Step-down Plan | Completion Date |
|--|------------------------|
| Wildlife Management Plan | 2013 |
| Biological Inventory/Monitoring Plan | 2012 |
| Endangered Species Recovery Plan | 2011 |
| Habitat Management | 2013 |
| Moist Soil/Water Management | 2012 |
| Forest Management | 2011 |
| Integrated Pest Management | 2012 |
| Nuisance Animal Control | 2012 |
| Exotic Plant Control | 2012 |
| Wildland and Structural Fire Management | 2011 |
| Law Enforcement | 2012 |
| Cultural Resources Management Plan | 2013 |
| Visitor Services | 2012 |
| Wildlife Observation and Photography | 2011 |
| Environmental Education and Interpretation | 2011 |
| Safety/Contingency Plan | 2011 |
| Oil and Hazardous Substances | 2011 |

Note: Plans are shown in sequence according to goals and objectives listed in Chapter IV of this plan.

Appendix A. Glossary

- Adaptive Management:** Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in a management plan. Analysis of results helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.
- Alluvial:** Sediment transported and deposited in a delta or riverbed by flowing water.
- Alternative:** 1. A reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2). 2. Alternatives are different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission, and resolving issues (Service Manual 602 FW 1.6B).
- Anadromous:** Migratory fishes that spend most of their lives in the sea and migrate to fresh water to breed.
- Biological Diversity:** The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (Service Manual 052 FW 1. 12B). The System's focus is on indigenous species, biotic communities, and ecological processes. Also referred to as biodiversity.
- Carrying Capacity:** The maximum population of a species able to be supported by a habitat or area.
- Categorical Exclusion:** A category of actions that does not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).
- CFR:** Code of Federal Regulations.
- Compatible Use:** A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purpose(s) of the national wildlife refuge [50 CFR 25.12 (a)]. A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

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

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

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

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| National Wildlife Refuge: | A designated area of land, water, or an interest in land or water within the Refuge System. |
| Native Species: | Species that normally live and thrive in a particular ecosystem. |
| Noxious Weed: | A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States. According to the Federal Noxious Weed Act (P.L. 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health. |
| Objective: | A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Making objectives attainable, time-specific, and measurable (Service Manual 602 FW 1.6N). |
| Plant Association: | A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community. |
| Plant Community: | An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community. |
| Preferred Alternative: | This is the alternative determined (by the decision-maker) to best achieve the refuge purpose, vision, and goals; contributes to the Refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management. |
| Prescribed Fire: | The application of fire to wildland fuels to achieve identified land use objectives (Service Manual 621 FW 1.7). May occur from natural ignition or intentional ignition. |
| Priority Species: | Fish and wildlife species that require protective measures and/or management guidelines to ensure their perpetuation. Priority species include the following: (1) State-listed and candidate species; (2) species or groups of animals susceptible to significant population declines within a specific area or statewide by virtue of their inclination to aggregate (e.g., seabird colonies); and (3) species of recreation, commercial, and/or tribal importance. |
| Public Involvement Plan: | Broad long-term guidance for involving the public in the comprehensive conservation planning process. |

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| Public Involvement: | A process that offers impacted and interested individuals and organizations an opportunity to become informed about, and to express their opinions on Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management. |
| Public: | Individuals, organizations, and groups; officials of federal, state, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in service issues and those who do or do not realize that Service decisions may affect them. |
| Purposes of the Refuge: | “The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge sub-unit.” For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge (Service Manual 602 FW 106 S). |
| Recommended Wilderness: | Areas studied and found suitable for wilderness designation by both the Director of the Fish and Wildlife Service and the 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 Purposes: | See Purposes of the Refuge |
| Songbirds: (Also Passerines) | A category of birds that is medium to small, perching landbirds. Most are territorial singers and migratory. |
| Step-down Management Plan: | A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, and safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives (Service Manual 602 FW 1.6 U). |

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| Strategy: | A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.6 U). |
| Study Area: | The area reviewed in detail for wildlife, habitat, and public use potential. For purposes of this CCP, the study area includes the lands within the currently approved refuge boundary and potential refuge expansion areas. |
| Threatened Species (Federal): | Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range. |
| Threatened Species (State): | A plant or animal species likely to become endangered in the state within the near future if factors contributing to population decline or habitat degradation or loss continue. |
| Tiering: | The coverage of general matters in broader environmental impact statements with subsequent narrower statements of environmental analysis, incorporating by reference, the general discussions and concentrating on specific issues (40 CFR 1508.28). |
| U.S. Fish and Wildlife Service Mission: | The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. |
| Unit Objective: | See Objective |
| Vegetation Type, Habitat Type, Forest Cover Type: | A land classification system based upon the concept of distinct plant associations. |
| Vision Statement: | A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates. We will tie the vision statement for the refuge to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates (Service Manual 602 FW 1.6 Z). |

Wilderness Study Areas:

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

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

Wilderness:

See Designated Wilderness

Wildfire:

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

Wildland Fire:

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

ACRONYMS AND ABBREVIATIONS

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

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Appendix C. Relevant Legal Mandates and Executive Orders

| STATUTE | DESCRIPTION |
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| Administrative Procedures Act (1946) | Outlines administrative procedures to be followed by federal agencies with respect to identification of information to be made public; publication of material in the Federal Register; maintenance of records; attendance and notification requirements for specific meetings and hearings; issuance of licenses; and review of agency actions. |
| American Antiquities Act of 1906 | Provides penalties for unauthorized collection, excavation, or destruction of historic or prehistoric ruins, monuments, or objects of antiquity on lands owned or controlled by the United States. The Act authorizes the President to designate as national monuments objects or areas of historic or scientific interest on lands owned or controlled by the 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 interests 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. |

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

| STATUTE | DESCRIPTION |
|---|---|
| Coastal Wetlands Planning, Protection, and Restoration (1990) | Authorizes the Director of the Fish and Wildlife Service to participate in the development of a Louisiana coastal wetlands restoration program, participate in the development and oversight of a coastal wetlands conservation program, and lead in the implementation and administration of a national coastal wetlands grant program. |
| Coastal Zone Management Act of 1972, as amended | Established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans and requires that “any federal activity within or outside of the coastal zone that affects any land or water use or natural resource of the coastal zone” shall be “consistent to the maximum extent practicable with the enforceable policies” of a state’s coastal zone management plan. The law includes an Enhancement Grants Program for protecting, restoring, or enhancing existing coastal wetlands or creating new coastal wetlands. It also established the National Estuarine Research Reserve System, guidelines for estuarine research, and financial assistance for land acquisition. |
| 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 U.S. Environmental Protection Agency to develop and administer a federal environmental education program in consultation with other federal natural resource management agencies, including the Fish and Wildlife Service. |

| STATUTE | DESCRIPTION |
|--|---|
| Estuary Protection Act of 1968 | Authorized the Secretary of the Interior, in cooperation with other federal agencies and the states, to study and inventory estuaries of the United States, including land and water of the Great Lakes, and to determine whether such areas should be acquired for protection. The Secretary is also required to encourage state and local governments to consider the importance of estuaries in their planning activities relative to federal natural resource grants. In approving any state grants for acquisition of estuaries, the Secretary was required to establish conditions to ensure the permanent protection of estuaries. |
| Estuaries and Clean Waters Act of 2000 | This law creates a federal interagency council that includes the Director of the Fish and Wildlife Service, the Secretary of the Army for Civil Works, the Secretary of Agriculture, the Administrator of the Environmental Protection Agency and the Administrator for the National Oceanic and Atmospheric Administration. The council is charged with developing a national estuary habitat restoration strategy and providing grants to entities to restore and protect estuary habitat to promote the strategy. |
| Food Security Act of 1985, as amended (Farm Bill) | 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. |
| 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. |

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

| STATUTE | DESCRIPTION |
|--|--|
| Improvement Act of 1978 | This act was passed to improve the administration of fish and wildlife programs and amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out volunteer programs. |
| 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. |
| 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. |
| Marine Mammal Protection Act of 1972, as amended | The 1972 Marine Mammal Protection Act established a federal responsibility to conserve marine mammals with management vested in the Department of the Interior for sea otter, walrus, polar bear, dugong, and manatee. The Department of Commerce is responsible for cetaceans and pinnipeds, other than the walrus. With certain specified exceptions, the Act establishes a moratorium on the taking and importation of marine mammals, as well as products taken from them. |

| STATUTE | 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,” requires waterfowl hunters 16 years of age or older to possess a valid federal hunting stamp. Receipts from the sale of the stamp are deposited into the Migratory Bird Conservation Fund for the acquisition of migratory bird refuges. |
| Migratory Bird Treaty Act of 1918, as amended | This Act implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Except as allowed by special regulations, this Act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, barter, export or import any migratory bird, part, nest, egg, or product. |
| Mineral Leasing Act for Acquired Lands (1947), as amended | Authorizes and governs mineral leasing on acquired public lands. |
| Minerals Leasing Act of 1920, as amended | Authorizes and governs leasing of public lands for development of deposits of coal, oil, gas, and other hydrocarbons; sulphur; phosphate; potassium; and sodium. Section 185 of this title contains provisions relating to granting rights-of-way over federal lands for pipelines. |
| Mining Act of 1872, as amended | Authorizes and governs prospecting and mining for the so-called “hardrock” minerals (i.e., gold and silver) on public lands. |
| National and Community Service Act of 1990 | Authorizes several programs to engage citizens of the U.S. in full-and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Among other things, this law establishes the American Conservation and Youth Service Corps to engage young adults in approved human and natural resource projects, which will benefit the public or are carried out on federal or Indian lands. |
| National Environmental Policy Act of 1969 | Requires analysis, public comment, and reporting for environmental impacts of federal actions. It stipulates the factors to be considered in environmental impact statements, and requires that federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unqualified environmental values are given appropriate consideration, along with economic and technical considerations. |

| STATUTE | 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 Congress. Several national trails cross units of the National Wildlife Refuge System. |
| National Wildlife Refuge System Administration Act of 1966 | Prior to 1966, there was no single federal law that governed the administration of the various national wildlife refuges that had been established. This Act defines the National Wildlife Refuge System and authorizes the Secretary of the Interior to permit any use of a refuge provided such use is compatible with the major purposes(s) for which the refuge was established. |
| National Wildlife Refuge System Improvement Act of 1997 | This Act amends the National Wildlife Refuge System Administration Act of 1966. This Act defines the mission of the National Wildlife Refuge System, establishes the legitimacy and appropriateness of six priority wildlife-dependent public uses, establishes a formal process for determining compatible uses of Refuge System lands, identifies the Secretary of the Interior as responsible for managing and protecting the Refuge System, and requires the development of a comprehensive conservation plan for all refuges outside of Alaska. |
| Native American Graves Protection and Repatriation Act of 1990 | Requires federal agencies and museums to inventory, determine ownership of, and repatriate certain cultural items and human remains under their control or possession. The Act also addresses the repatriation of cultural items inadvertently discovered by construction activities on lands managed by the agency. |
| Neotropical Migratory Bird Conservation Act of 2000 | Establishes a matching grant program to fund projects that promote the conservation of neotropical migratory birds in the United States, Latin America, and the Caribbean. |

| STATUTE | DESCRIPTION |
|---|--|
| North American Wetlands Conservation Act of 1989 | Provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, the United States, and Mexico. The North American Wetlands Conservation Council was created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. Available funds may be expended for up to 50 percent of the United States' share cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on federal lands). |
| Refuge Recreation Act of 1962, as amended | This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife-oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses. |
| Partnerships for Wildlife Act of 1992 | Establishes a Wildlife Conservation and Appreciation Fund to receive appropriated funds and donations from the National Fish and Wildlife Foundation and other private sources to assist the state fish and game agencies in carrying out their responsibilities for conservation of non-game species. The funding formula is no more 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. |

| STATUTE | DESCRIPTION |
|---|---|
| Sikes Act (1960), as amended | Provides for the cooperation by the Departments of Interior and Defense with state agencies in planning, development, and maintenance of fish and wildlife resources and outdoor recreation facilities on military reservations throughout the 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 that federal and state fish and wildlife agencies be given priority in management of fish and wildlife activities on military reservations. |
| Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948 | 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 | This Act directs the Secretary of the Interior to review every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The Act permits certain activities within designated wilderness areas that do not alter natural processes. Wilderness values are preserved through a "minimum tool" management approach, which requires refuge managers to use the least intrusive methods, equipment, and facilities necessary for administering the areas. |

| STATUTE | DESCRIPTION |
|--------------------------------------|--|
| Youth Conservation Corps Act of 1970 | Established a permanent Youth Conservation Corps (YCC) program within the Departments of Interior and Agriculture. Within the Service, YCC participants perform many tasks on refuges, fish hatcheries, and research stations. |

| EXECUTIVE ORDERS | DESCRIPTIONS |
|---|---|
| EO 11593, Protection and Enhancement of the Cultural Environment (1971) | States that if the Service proposes any development activities that may affect the archaeological or historic sites, the Service will consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended. |
| EO 11644, Use of Off-road Vehicles on Public Land (1972) | Established policies and procedures to ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. |
| EO 11988, Floodplain Management (1977) | The purpose of this Executive Order is to prevent federal agencies from contributing to the “adverse impacts associated with occupancy and modification of floodplains” and the “direct or indirect support of floodplain development.” In the course of fulfilling their respective authorities, federal agencies “shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.” |
| EO 11989 (1977), Amends Section 2 of EO 11644 | Directs agencies to close areas negatively impacted by off-road vehicles. |
| EO 11990, Protection of Wetlands (1977) | Federal agencies are directed to provide leadership and take action to minimize the destruction, loss of degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. |
| EO 12372, Intergovernmental Review of Federal Programs (1982) | Seeks to foster intergovernmental partnerships by requiring federal agencies to use the state process to determine and address concerns of state and local elected officials with proposed federal assistance and development programs. |

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

| EXECUTIVE ORDERS | DESCRIPTIONS |
|---|---|
| EO 13112, Invasive Species (1999) | Federal agencies are directed to prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, accurately monitor invasive species, provide for restoration of native species and habitat conditions, conduct research to prevent introductions and to control invasive species, and promote public education on invasive species and the means to address them. This EO replaces and rescinds EO 11987, Exotic Organisms (1977). |
| 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

Public involvement is a very important part of the development of all CCPs. Every effort was made to assure that public comments were solicited throughout the development of this CCP.

This appendix contains the following:

- A copy of the cover letter that accompanied the above request;
- A copy of the Public Comment Form submitted with the cover letter.
- A summary of the public comments received.



Watercress Darter National Wildlife Refuge

The Fish and Wildlife Service (FWS) will soon initiate the preparation of a long-range management plan for the Watercress Darter National Wildlife Refuge (NWR), which is located within the city limits of Bessemer, Jefferson County, Alabama (map attached). This Comprehensive Conservation Plan (CCP) will guide management actions and direction for the refuge for the next 15 years. Fish and wildlife conservation will receive first priority in refuge management; wildlife-dependent recreation will be allowed and encouraged as long as it is compatible with, and does not detract from, the mission of the refuge or the purposes for which it was established.

In 1970, the watercress darter (*Etheostoma nuchale*) was officially recognized as an endangered species by the FWS. The watercress darter was known to naturally occur in only three springs in Jefferson County, Alabama. The springs and creeks into which they flow are all within the Black Warrior River watershed. The population at Glenn Springs (tributary of Halls Creek) was first collected in 1964. Additional field work resulted in the location of two other populations: one at Thomas Spring (also a tributary of Halls Creek), and the other at Roebuck Springs (a tributary of Village Creek)

Planning efforts for the establishment of Watercress Darter NWR were completed by the Service in 1979, and included the planned acquisition of 1.5 acres at Thomas Spring and 1.0 acre at Glenn Springs. The refuge was established on October 1, 1980, when 7.1 acres were acquired in fee title at Thomas Spring. In 1983, the Service constructed a pond just downstream from Thomas Spring and vegetated the pond with appropriate aquatic vegetation for additional watercress darter habitat. In January 1988, 100 watercress darters were relocated from Thomas Spring into this newly constructed pond. Although no land has been acquired at Glenn Springs, habitat protection efforts were undertaken in cooperation with the landowner at that site. In 1988, a new population was established by transplanting watercress darters from Roebuck Springs to Tapawingo Springs (tributary of Turkey Creek) in Jefferson County. An expansion of 30 additional acres (2 acres at Thomas Spring and 28 acres at Roebuck Springs) was approved on March 9, 1995, but only the 2-acre Thomas Spring parcel was purchased. In 2001, the refuge was expanded again to include an additional 16 acres adjacent to Thomas Spring. The approved acquisition boundary consists of 28 acres at Roebuck Springs, 25 acres at Thomas Spring, and 1 acre at Glenn Springs. Currently, the Service owns, in fee title, a total of 24.52 acres at Thomas Spring and no property has been acquired at Glenn Springs or Roebuck Springs.

A planning team will develop a range of alternatives that best meet the goals and objectives of the refuge and that could be implemented within the 15-year planning period. An environmental assessment will describe the proposed plan, as well as other alternatives considered and their effects on the environment. The Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) will be made available to state and federal government agencies, conservation partners, and the general public for review and comment. Comments from everyone will be considered in the development of the final CCP.

The purpose of the CCP is to develop a management action that will best achieve the refuge purpose; attain the vision and goals developed for the refuge; contribute to National Wildlife Refuge System mission; address key problems, issues and relevant mandates; and that will be consistent with sound principles of fish and wildlife management.

Specifically, the plan is needed to:

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

The public can play an integral role in management of the refuge by being involved in development of this CCP. The planning process provides for public involvement in developing a plan for the future management of the refuge. Plans are revised every 15 years, or earlier, if monitoring and evaluation determine that changes are needed to achieve refuge purposes, vision, goals, and/or objectives. The basic steps of the planning process involve gathering information, scoping public input, developing the Draft CCP/EA, gathering and reviewing public input on the Draft CCP, developing the final CCP, and implementing and monitoring the actions identified in the final CCP.

Attached is a comment form that you can use to provide us with your issues, concerns, and suggestions for this planning process.



**Watercress Darter National Wildlife Refuge
Comprehensive Conservation Planning (CCP) Process
Jefferson County, Bessemer, AL
April 4, 2007**

We welcome your comments and suggestions for the CCP in writing. You can use this form to write your comments on issues that should be addressed in the CCP and environmental assessment. Simply fold this form in half, staple or tape it, stamp, and mail. To be most useful, written comments should be sent by **June 1, 2007**. You may request extras for your friends and neighbors.

If you have any questions or comments concerning this meeting or the issues involved, please contact Steve Miller at the address on the back side of this form, at 256-848-6833 or stephen_a_miller@fws.gov.

Name _____

Mailing Address _____

City, State, Zip Code _____

Would you like to receive a summary of the Draft Comprehensive Conservation Plan? Yes ___
No ___

What do you think are the most important issues facing Watercress Darter National Wildlife Refuge?

How do you think these issues should be addressed?

Should refuge habitats and wildlife be managed any differently than they are today?

Are the types of public use and visitation permitted and encouraged by the refuge appropriate?

Any other comments or suggestions you would like to make on how the refuge should be managed over the coming 15 years?

Do you think a public meeting should be held to obtain comments?

SUMMARY OF PUBLIC SCOPING COMMENTS

Wildlife and habitat-related issues, concerns and opportunities

- Develop and implement a consistent population monitoring plan for the watercress darter.
- Monitor contaminants present and determine ways to reduce the impact of these on watercress darter habitat.
- Determine recharge areas for Glenn and Thomas Springs.
- Introduce watercress darters into other suitable habitats.

Resource protection-related issues, concerns, and opportunities

- Control exotic, invasive flora on the refuge.
- Protect recharge areas at Glenn and Thomas Springs.
- Investigate a refuge boundary expansion to include recharge areas, spring-runs, and stream reaches adjacent to Thomas and Glenn Springs.
- Increase law enforcement presence on the refuge.
- Assess water quality upstream from known watercress darter populations.
- Collaborate with city officials and work with civic and non-profit groups to leverage resources and implement habitat restoration.
- Embrace partners like CAWACO and Black Warrior Clean Water Partnership.

Public use and visitation-related issues, concerns, and opportunities

- Expand public use facilities and opportunities on the refuge.
- Increase opportunities for wildlife observation and wildlife photography.
- Increase emphasis on environmental education and interpretation to increase understanding of the importance of refuge habitats and resources, especially watercress darter.

DRAFT PLAN COMMENTS AND SERVICE RESPONSES

The Draft CCP/EA for Watercress Darter NWR was made available for public review and comment for a period of 30 days, beginning on April 16, 2010, and closing on May 17, 2010. The Service received written or telephone comments from five members of the general public and one organization.

In accordance with the requirements of the National Environmental Policy Act, the Service responded to substantive comments. For the 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. On the other hand, a comment such as “We love the refuge” would not be considered substantive.)

The comments received during the public review and comment period were evaluated, summarized, and grouped into several categories: Wildlife and Habitat Management; Resource Protection; Visitor Services; Refuge Administration; Alternatives; References; Notification of Public Review and Comment Period; and Minor Corrections. Comments on like topics were grouped together. The Service’s responses to the comments are provided by category. The page numbers referenced relate to the original page numbers in the Draft CCP/EA that was released for public review and comment.

FISH AND WILDLIFE POPULATION MANAGEMENT

Comment: A professor and noted researcher from Samford University stated support for Alternative C (proposed alternative) and several facets of the plan. He also indicated that the plan incorrectly stated that an attempt was made to relocate watercress darters to Indian Valley Springs (Cahaba River system).

Service Response: Page 27, **Watercress Darter**, first paragraph, last sentence was changed to read, “Attempts to relocate watercress darters in Avondale Springs failed and transplanting was never attempted at Indian Valley Springs.”

Comment: Two professors and noted researchers from the University of Alabama made several comments regarding the need to clarify known collection areas for the watercress darter. They also included updated information for the section on the Watercress Darter Recovery Plan and current literature citations.

Service Response: The CCP was updated to reflect the following points:

Page 6, **Watercress Darter Recovery Plan**, third paragraph, third line, “and wetlands” was inserted after “spring pools.” The following sentence was added at the end of the third paragraph, “Watercress darters have also been found in the creek below Seven Springs run (Nabors Creek) between 31 street and Jefferson Avenue.”

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- Page 7, **Watercress Darter Recovery Plan**, third paragraph, last sentence was changed to read, “Changes in quality and quantity of groundwater from the recharge area in all the spring sites are associated with the poor use of best management practices for urbanization, storm water management, and sedimentation which impacts watersheds on adjoining non-protected lands that drain the immediate areas and impacts aquifer recharge areas on a larger scale.”
- Page 7, **Recovery Criteria**, first bullet was changed to read, “Long-term protection of the three naturally occurring populations known in 1992 (i.e., those found in Glenn, Thomas, Seven, and Roebuck Springs);
- Page 10, **Introduction**, first paragraph, was changed to read, “The watercress darter (*Etheostoma nuchale*) is endemic to four limestone springs of the Valley and Ridge Physiographic Province in the Black Warrior River System (Figure 2) in Jefferson County, Alabama (Boschung and Mayden 2004). Three of the springs where the species naturally occurs (Glenn, Thomas, and Seven) are tributaries to Valley Creek, while the fourth (Roebuck) is a tributary to Village Creek, which joins the Locust Fork. The Locust Fork and Valley Creek both join the Black Warrior River to the west.”
- Page 15, **Regional Plans and Initiatives**, first paragraph, first and second sentence were changed to read, “The Alabama Comprehensive Wildlife Conservation Strategy (CWCS) (ADWFF 2005) lists the Priority Fish Species as Priority 1, 2, or 3. The watercress darter is Priority 1.”
- Page 19, **Alterations To Hydrology and Degradation of Aquatic Systems**, the following sentence was added to the end of the third paragraph, “Glenn Springs is already affected with low flow and reduced volume.”
- Page 21, **Alterations To Hydrology and Degradation of Aquatic Systems**, first paragraph, first and last sentence, the citation was changed to “(Fluker et al. 2009).”
- Page 21, **Alterations To Hydrology and Degradation of Aquatic Systems**, second paragraph, first sentence, “Sipsey” was deleted.
- Page 22, **Hydrology**, first paragraph, last sentence, was changed to read, “Rainfall is not available to recharge acquifers that feed local springs at historic levels when the water is swiftly channeled off parking lots into drains.”
- Page 24, **Water Quality and Quantity**, third paragraph, first sentence, the citation was changed to “(Fluker et al. 2009).”
- Page 25, **Water Quality and Quantity**, fourth paragraph, second sentence, the citation was changed to “(Duncan et al. 2010).”
- Page 26, **Watercress Darter**, first paragraph, fourth sentence was changed to read, “They are found mainly in aquatic vegetation in springs and spring runs and are subject to predation from green sunfish, bluegills, and sculpins.”
- Page 37, **Fish and Wildlife Population Management**, fifth bullet was changed to read, “Restore habitats including streams below spring runs (Halls, Nabors, and Village Creeks).”

HABITAT MANAGEMENT

Comment: Two professors and noted researchers from the University of Alabama made suggestions regarding habitat management..

Page 37, **Habitat Management**, first and second bullets were changed to read, "Conduct a baseline water analysis at Thomas, Glenn, and Roebuck Springs." "Determine recharge area for Thomas, Glenn, and Roebuck Springs."

Comment: Comment from a law firm representing the city of Birmingham. The CCP does not include any discussion of additional data collected at Roebuck Springs in 2009 by Richardson, Selby, and Howell. This sampling data show that the watercress darter population at Roebuck Spring is healthy, expanding, and at historic highs.

Service Response: A reference to the data collection by Richardson, Selby, and Howell has been included in a new paragraph at the end of the **Alteration to Hydrology and Degradation of Aquatic Systems** section on page 27.

Comment: Comment from a law firm representing the city of Birmingham. The conclusions in the Draft CCP about population health trends simply are not correct with respect to Roebuck Spring.

Service Response: The Draft CCP made no conclusions about population health trends at Roebuck Springs. The CCP described the loss of habitat and resulting death of thousands of watercress darters due to a dam removal. Future research and monitoring will be necessary to make any conclusions about the long-term health of this population at Roebuck Springs.

Comment: Comment from a law firm representing the city of Birmingham. The Draft CCP is inconsistent with the Five-Year Review in its estimation of the amount of habitat that was temporarily unavailable due to maintenance activities at the spring pool at Roebuck Spring in the fall of 2008. In one place it states that after the dam removal at the Roebuck Springs site about 80 to 90 percent of the aquatic habitat for the watercress darter was drained. However, is squarely contradicted by the Service's Five-Year Review, which states that only "up to 57% of the habitat was drained."

Service Response: We concur. The percent of habitat drained has been changed to "up to 57 percent" on page 20, seventh paragraph, second sentence and on page 26, third paragraph, first sentence.

RESOURCE PROTECTION

Comment: The Service's Fire Management Staff in the Regional Office indicated that the refuge boundary should be evaluated for fire protection.

Service Response: Page 46, **Objective 3.2**, the following bullet was added as a strategy, "Evaluate the refuge boundary for fire protection."

Comment: Two professors and noted researchers from the University of Alabama made several comments regarding resource protection.

Page 37, last bullet was changed to read, "Conserve trees in riparian zones adjacent to watercress darter habitat (springs, spring runs, and creeks) and plant additional trees where needed."

Page 42, **Objective 1.1**, Strategies, the last bullet was changed to read, “Monitor ground water at spring head yearly for contaminants, bacteria, and flow levels using an approved protocol.”

Page 43, **Objective 2.2**, Discussion, the last sentence was changed to read, “Groundwater quantity can be affected by paving, storm water systems, rooftops or other “hardening” of recharge areas.”

Page 43, **Objective 3.1**, Discussion, the last sentence was changed to read, “Groundwater quantity can be affected by paving, storm water systems, rooftops, or other “hardening” of recharge areas.”

Page 45, **Objective 3.2**, Strategies, an additional bullet was added, “Determine recharge area for Roebuck Springs.”

ALTERNATIVES

Comment: Comment from a law firm representing the city of Birmingham. The proper focus of the CCP and management objectives should be on the refuge proper, as reflected in Alternative B.

Service Response: Comment noted. The Service evaluated three management alternatives in the EA. Based on that analysis, Alternative C was determined to best serve the purposes, vision, and goals of the refuge and the mission of the Refuge System.

REFERENCES

Comment: Comment from a law firm representing the city of Birmingham. It is unclear why the Draft CCP contains any discussion at all of 2008 events at Roebuck Springs, given that the area is not even part of refuge. It is particularly egregious for the Service to include these 2008 habitat loss estimates, but to ignore and exclude the more recent 2009 population data that was gathered and submitted by the city.

Service Response: The planning team was not aware of the 2009 population data when the draft CCP was prepared. As stated in a previous response, this information will be included in the final CCP. Roebuck Springs is within the approved acquisition boundary of Watercress Darter NWR and one of only five springs where this endangered species is found. The very limited distribution of watercress darters makes them highly vulnerable to threats. One of the goals in the CCP is to identify and conserve natural and cultural resources on the refuge and promote conservation through interagency and private landowner cooperation, partnerships, and land protection programs in the Black Warrior River Watershed. During this 15-year plan, the refuge staff will continue to encourage and support the protection of Roebuck Springs.

Comment: Comment from a law firm representing the city of Birmingham. It is my understanding that the Service no longer intends to rely on one of the references listed in the Draft CCP-namely, Fluker, B. and B. Kuhajda, 2009. As I understand it, that reference was not directly reviewed by the Service and is not available for public review and comment. The reference should be deleted from the final CCP. If the Service decides not to remove the reference, we request that the document be made available for public review and the comment period on the Draft CCP extended to allow for comment on it.

Service Response: This reference has now been published and peer reviewed and will remain in the CCP. The citation in the document has been changed to Fluker et al. 2009. We do not concur with the request to extend the comment period. Any comments received on the final CCP will be taken into consideration before the plan is finalized.

Comment: One citizen stated support for preservation of the species, but does not believe that the Service works for the people who want to save the earth.

Service Response: Comment noted.

Appendix E. Compatibility Determinations

Watercress Darter National Wildlife Refuge Compatibility Determination

Uses: The following uses were considered for compatibility determination.

1. Environmental Education and Interpretation
2. Wildlife Observation and Photography

Refuge Name: Watercress Darter National Wildlife Refuge

County: Jefferson, Alabama

Establishing and Acquisition Authorities:

Endangered Species Act

Additional acquisition authority: Fish and Wildlife Act 1956

Refuge Purposes:

Establishment purpose: "... 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)

Additional purposes: "... 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)

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.

Note: Compatibility determinations for each description listed were considered separately. Although for brevity, the preceding sections from "Uses" through "National Wildlife Refuge System Mission" and the succeeding "Approval of Compatibility Determinations" are only written once within the CCP, they are part of each descriptive use and become part of that compatibility determination if considered outside of the CCP.

Description of Use: Environmental education and interpretation

Environmental education and interpretation are two of the six legislated wildlife-dependent, priority public uses of the National Wildlife Refuge System. Despite having been established in 1980, Watercress Darter NWR has never had an active environmental education or interpretation program. This is due to its small size, lack of on-site staff, and the distance of the refuge from the nearest, adequately staffed refuge. Local interest in these activities is unknown. This priority public use will be expanded as resources and demand permit.

Environmental education and interpretation would occur both on- and off-site at appropriate locations as staff, funding, and partnerships are developed. These activities would be subject to any applicable federal, state, and refuge regulations. An intra-service Section 7 permit will ensure that these activities do not impact endangered species and would not conflict with needed management.

Environmental education and interpretation are proposed to offer the public educational opportunities that are identified as the priority wildlife-dependent public uses of the National Wildlife Refuge System.

Availability of Resources:

Approximately \$36,000 of staff time will be needed annually to support this use. Maintenance needs are expected to cost \$15,000 annually, with an additional \$79,000 needed the first year to administer this use.

Watercress Darter NWR and Cahaba River NWR are currently unstaffed refuges administered by the staff at Mountain Longleaf NWR, which consists of two employees. Mountain Longleaf NWR (to include Watercress Darter NWR and Cahaba River NWR) is complexed with Wheeler NWR for administrative and maintenance support.

Interpretive signs must be developed and installed to support these uses. Improvements to trails are necessary to support those persons with disabilities.

Monitoring or Guiding of Activities - \$32,000

Trash Pick-up - \$500

Staff Time for Maintenance Activities Described Below - \$4,000

Trail Repair - \$75,000

Signing - \$4,000

Vehicle - \$8,000

Mowing - \$1,000

In order to ensure a safe educational experience, periodic law enforcement patrols are needed at this urban refuge. It is estimated that 10 percent of a law enforcement employee's time would be spent in support of these uses at Watercress Darter NWR.

The refuge may utilize automatic traffic counters in order to track the number of vehicles for all uses combined. Costs for this effort attributable to environmental education and interpretation are estimated at \$300 initially and \$100 annually after the first year.

Offsetting revenues: None

Watercress Darter NWR has several projects within the Refuge Operation and Needs System that would provide for support of outdoor education and interpretation. It is unknown when or if these projects will be funded.

The Comprehensive Conservation Plan for Watercress Darter NWR identifies one full-time position and four additional positions to be shared between Watercress Darter NWR and Cahaba River NWR. Both refuges are currently unstaffed.

The refuge has partnered with the Birmingham Chapter of the National Audubon Society on past projects and the possibility of this organization assisting in outdoor education and interpretation will be pursued.

The West Jefferson County Historical Society owns a historical building adjacent to the refuge. This organization may be able to assist with certain aspects of our outdoor education and interpretation program and this opportunity will be pursued.

Anticipated Impacts of the Use:

Anticipated short-term impacts from this use are minor damage to vegetation, littering, increased maintenance activities, potential conflicts with other visitors, and disturbance to wildlife.

No long-term impacts to wildlife or habitats are anticipated.

No cumulative impacts are anticipated.

Public Review and Comment:

This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Watercress Darter NWR. The availability of the Draft CCP/EA was announced in the *Federal Register* on April 16, 2010 (75 FR 19988), for a 30-day public review and comment period. Since Watercress Darter NWR is unstaffed, copies of the Draft CCP/EA were posted at Mountain Longleaf NWR, which serves as the refuge's headquarters, and also at Wheeler NWR, complex headquarters for both refuges. Copies were distributed to local landowners, the public, and local, state, and federal agencies.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Periodic closures of portions of the refuge may be implemented for habitat management activities, environmental remediation, or public safety.

Justification:

Allowing environmental education and interpretation on the refuge would fulfill two mandates of the Improvement Act. Environmental education and interpretation are two of the six wildlife-dependent public uses that are to be supported, when found to be compatible, within units of the National Wildlife Refuge System.

These uses are not expected to conflict with any proposed habitat management or endangered species recovery efforts on the refuge.

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

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

Mandatory 15-Year Re-evaluation Date: 09/21/2025

Description of Use: Wildlife observation and photography

Wildlife observation and photography are legislated wildlife-dependent, priority public uses of the National Wildlife Refuge System. Despite having been established in 1980, Watercress Darter NWR has never had an active wildlife observation or photography program although the refuge has been open to the public to participate in these activities. This is primarily due to its small size, lack of on-site staff, and lack of knowledge of the availability of this activity in the local and regional area. Local interest in this activity is unknown. These priority public uses will be expanded as resources and demand permit.

Wildlife observation and photography are most likely to occur along the designated walking trail and from the overlook platform at New Pool during daylight hours. These activities would be subject to any applicable federal, state, and refuge-specific regulations and occur within designated public use areas on the refuge. A separate Intra-Service Section 7 permit will ensure that these activities do not impact endangered species and would not conflict with needed management.

Wildlife observation and photography are proposed to offer the public an opportunity to participate in priority wildlife-dependent public uses of the National Wildlife Refuge System.

Availability of Resources:

Approximately \$40,000 of staff time will be needed annually to support these uses. In addition, \$6,500 is needed for annual recurring costs. One-time start-up costs in the amount of \$25,000 are needed for facility improvements and repairs.

Watercress Darter NWR and Cahaba River NWR are currently unstaffed refuges administered by the staff at Mountain Longleaf NWR, which consists of two employees. Mountain Longleaf NWR (to include Watercress Darter and Cahaba River NWR) is complexed with Wheeler NWR for administrative and maintenance support.

The existing trail system and observation platform at Watercress Darter NWR will be maintained to support this use. Increased maintenance of existing facilities is necessary to fully support this use.

Monitoring or Guiding of Activities - \$18,000

Trash Pick-up - \$500

Staff Time for Maintenance Activities Described Below - \$6,500

Trail Repair and Blind Construction - \$25,000

Vehicle - \$5,000

Mowing - \$1,000

In order to ensure a safe recreational experience, periodic law enforcement patrols are needed at this urban refuge. It is estimated that 10 percent of a law enforcement officer's time would be spent in support of these uses at Watercress Darter NWR.

The refuge may utilize automatic traffic counters in order to track the number of vehicles for all uses combined. Costs for this effort attributable to environmental education and wildlife observation and photography are estimated at \$300 initially and \$100 annually after the first year.

Offsetting revenues: None

Watercress Darter NWR has several projects within the Refuge Operation and Needs System that would provide for further support of wildlife observation. It is unknown when or if these projects will be funded.

The Comprehensive Conservation Plan for Watercress Darter NWR identifies one full-time position and four additional positions to be shared between Watercress Darter NWR and Cahaba River NWR. Both refuges are currently unstaffed.

The refuge has partnered with the Birmingham Chapter of the National Audubon Society in support of this use.

Anticipated Impacts of the Use:

Anticipated short-term impacts from this use are minor damage to vegetation, littering, increased maintenance activities, potential conflicts with other visitors, and disturbance to wildlife.

No long-term impacts to wildlife or habitats are anticipated.

No cumulative impacts are anticipated.

Public Review and Comment:

This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Watercress Darter NWR. The availability of the Draft CCP/EA was announced in the *Federal Register* on April 16, 2010 (75 FR 19988), for a 30-day public review and comment period. Since Watercress Darter NWR is unstaffed, copies of the Draft CCP/EA were posted at Mountain Longleaf NWR, which serves as the refuge's headquarters, and also at Wheeler NWR, complex headquarters for both refuges. Copies were distributed to local landowners, the public, and local, state, and federal agencies.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Periodic closures of portions of the refuge may be implemented to conduct habitat management activities, environmental remediation, or to protect public safety.

Justification:

Allowing wildlife observation and photography on the refuge will fulfill a mandate of the Improvement Act. Wildlife observation and photography are two of the wildlife-dependent public uses that are to be supported within units of the National Wildlife Refuge System.

These uses are not expected to conflict with any proposed habitat management or endangered species recovery efforts on the refuge.

NEPA Compliance for Refuge Use Decision:

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

Mandatory 15-Year Re-evaluation Date: 09/21/2025

These priority wildlife-dependent uses have been denied without determining compatibility for the reasons listed on the following pages:

1. Hunting
2. Fishing

Use: Hunting

Is a compatibility Determination Necessary?

The National Wildlife Refuge System Administration Act of 1966, as amended, and Fish and Wildlife Service policy (603 FW 2.10) require development of compatibility determinations for all refuge uses (603 FW 2.6 Q.). Service policy also identifies those activities and other situations for which development of a compatibility determination is not appropriate or necessary (603 FW 2.10).

Hunting will be denied without determining compatibility because it meets at least one of the criteria listed in 603 FW 2.10 D. Hunting is inconsistent with public safety and would likely conflict with resource management objectives at Watercress Darter NWR.

The purpose of Watercress Darter NWR is to protect populations of federally endangered watercress darters found within the spring pools on the refuge. The small size of the refuge combined with its urban location does not allow the opportunity for hunting to occur in a safe manner. Populations of game species within this small refuge are not sufficient to support even a limited public hunt regardless of the impact to public safety.

Hunting may be used in the future as a resource management and/or sampling technique to determine wildlife health or to control a specific species' populations. The use of hunting as a management and sampling tool will be permitted through a special use permit as needed.

Use: Fishing

Is a compatibility Determination Necessary?

The National Wildlife Refuge System Administration Act of 1966, as amended, and Fish and Wildlife Service policy (603 FW 2.10) require development of compatibility determinations for all refuge uses (603 FW 2.6 Q.). Service policy also identifies those activities and other situations for which development of a compatibility determination is not appropriate or necessary (603 FW 2.10).

Fishing will be denied without determining compatibility because it meets at least one of the criteria listed in 603 FW 2.10 D. The purpose of Watercress Darter NWR is to protect populations of federally endangered watercress darters found within the spring pools on the refuge. Fishing conflicts with resource management objectives and would result in the potential take of the watercress darter as defined under the Endangered Species Act. Watercress darters lay eggs and escape predators while living within dense mats of aquatic vegetation. To prevent disturbance to watercress darters and their habitats, the refuge attempts to minimize disturbance to spring pools.

Fishing with a rod and reel may not result in direct take of an individual watercress darter but the disturbance to spring pools through the displacement of aquatic vegetation by repeated casts into the pool, the introduction of live bait or bait fish, or an attempt by an angler to collect bait fish within the pools pose a significant risk to populations of watercress darter and their habitats. Fishing, an otherwise compatible use, is denied in order to provide additional protection to watercress darters.

Fishing has been and will be used in the future as a resource management and sampling technique to determine if sport fish, currently within the pools, are resulting in direct mortality to watercress darters. The use of fishing as a management and sampling tool will be permitted through a special use permit as needed and approved by the appropriate officials.

Approval of Compatibility Determinations

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

Refuge Manager: Steve M 7/20/2010
(Signature/Date)

Regional Compatibility
Coordinator: Janice H 9/15/10
(Signature/Date)

Refuge Supervisor: [Signature] 09/15/2010
(Signature/Date)

Regional Chief, National
Wildlife Refuge System,
Southeast Region: [Signature] 9/16/2010
(Signature/Date)

Appendix F. Intra-Service Section 7 Biological Evaluation

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Division/Office: Watercress Darter National Wildlife Refuge (NWR)

Refuge Manager/Phone #: Steve Miller; 256/848-6833

Date: February 3, 2009

I. Proposed Action: Implementation of the Comprehensive Conservation Plan.

The U.S. Fish and Wildlife Service (Service) has developed a Comprehensive Conservation Plan to provide a foundation for the management and use of Watercress Darter NWR. The CCP is intended to serve as a working guide for the refuge's management programs and actions over the next 15 years.

II. Location (County and State/attach project area map):

Watercress Darter NWR, located within the city limits of Bessemer, Jefferson County, Alabama, was established by the Service in 1980 to provide protection for the watercress darter and to conserve and restore its crucial habitat. Today, the 25-acre refuge consists of two ponds, several stands of mixed pine-hardwoods with shrubs, and a single residence. Thomas Spring is a one quarter-acre pond where a population of watercress darters was found in 1976. A second pond was constructed on the refuge in 1983 by the Service to provide additional habitat for the darter.

III. Description of proposed action (describe in enough detail to allow proper evaluation of project impacts, attach additional pages as needed):

The CCP's overriding consideration is to carry out the purposes for which the refuge 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 refuge's mission and purposes.

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. 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 refuge, as stated previously, individual consultations will occur for projects specifically related to endangered species and critical habitat.

IV. Species and Habitats Considered:

A. List all federally endangered, threatened, proposed, and candidate species, and describe any associated critical or proposed critical habitat that may be affected by the proposed action. Make a determination of how the proposed action may affect each:

| SPECIES/CRITICAL HABITAT | STATUS ¹ | DETERMINATION ² | | | RESPONSE REQUESTED ³ |
|--------------------------|---------------------|----------------------------|----|----|---------------------------------|
| | | NE | NA | AA | |
| Watercress Darter | E | | X | | |
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¹STATUS: E = endangered, T = threatened, PE = proposed endangered, PT = proposed threatened, CH = critical habitat, PCH = proposed critical habitat, C = candidate species

²DETERMINATION:

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.

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.

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.

³RESPONSE REQUESTED: conference, concurrence, formal consultation

V. Determination of effects:

A. Explanation of effects of the action: include direct, indirect, interrelated, interdependent, and cumulative effects (attach additional pages as needed):

Definitions for Effects of the Action:

Direct Effects = are those that are an immediate result of the action.

Indirect Effects = are those that are caused by the action and are later in time but are still reasonably certain to occur. They include the effects of future activities that are induced by the action and that occur after the action is completed.

Interrelated = are those that are part of a larger action and depend on the larger action for their justification.

Interdependent = are those that have no significant independent utility apart from the action that is under consideration.

Cumulative Effects = are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area.

The proposed CCP should benefit the listed species.

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

n/a

VI.

Project Leader: Steph 5/14/2010
Signature Date

No effect: _____

Is not likely to adversely affect: _____

Is likely to adversely affect: _____

VII. Reviewing Ecological Services Office Evaluation:

A. Concurrence ___ Non-concurrence ___

B. Formal Consultation Required ___

C. Conference Required ___

D. Remarks (attach additional pages if needed): ___

VIII. Signatory Approval:

ES Supervisor: Jan Eason Deputy Field Supervisor
Signature Date: 5-24-2010

Note: The process ends here if the proposed action is "not likely to adversely affect".

Refuge Chief: _____
Signature Date

ARD Ecological Services: _____
Signature Date

Note: These signatures are required for approval of a conference report or biological opinion.

Appendix G. Wilderness Review

The Wilderness Act of 1964 defines a wilderness area as an area of federal land that retains its primeval character and influence, without permanent improvements or human inhabitation, and is managed so as to preserve its natural conditions and which:

1. generally appears to have been influenced primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
2. has outstanding opportunities for solitude or primitive and unconfined types of recreation;
3. has at least 5,000 contiguous roadless acres or is of sufficient size to make practicable its preservation and use in an unimpeded condition; or is a roadless island, regardless of size;
4. does not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or its wilderness character could be restored through appropriate management at the time of review; and
5. may contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

The lands within Watercress Darter NWR were reviewed for their suitability in meeting the criteria for wilderness, as defined by the Wilderness Act of 1964.

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

Appendix H. Refuge Biota

AN ANNOTATED BIRD LIST FOR THE WATERCRESS DARTER NATIONAL WILDLIFE REFUGE

Compiled by the Birmingham Chapter of the National Audubon Society
and
The Biology Department of Samford University

The Watercress Darter NWR is located in southwestern Bessemer at the corner of Division Street and Eastern Valley Road. The 27-acre site contains two small ponds which are 2 of only 4 remaining ponds forming the remaining habitat of this endangered small fish. The watercress darter is a member of the *Etheostoma swaini* species group, subgenus *Oligocephalus*. The species is approximately 2.5 inches in total length, and has bright red and blue lateral bars and fin color in the males. It is currently thought to be limited to Halls Creek, Thomas Spring, and adjacent spring runs in Bessemer, Alabama, and Roebuck Springs and its runs which are a tributary to Village Creek at Roebuck suburbs in northeastern Birmingham. Ground water flowing into Roebuck Springs already is known to be polluted by seepage from septic tanks, and pesticide runoff remains a threat. "Gas bubble disease" is affecting the Roebuck Springs population. High levels of coliform bacteria in Glenn Springs indicate some sources of pollution.

Our bird survey of this site started in 2007, with ornithology class field trips from Samford University and observations made by members of the Birmingham Chapter of the National Audubon Society. Below is a listing of the bird species noted during these visits followed by a field check list.

ANNOTATED LIST OF BIRDS SEEN IN THE REFUGE

Great Blue Heron (*Ardea herodias*). Uncommon, but may be a casual visitor throughout the year.

Green Heron (*Butorides virescens*). Occasional. This species nests throughout Alabama.

Little Blue Heron (*Egretta caerulea*). Occasional. A summer resident in Alabama. There are no colonies in the park.

Yellow-crowned Night-heron (*Nycticorax violacea*) Occasional summer visitor. Hunts for frogs, fish and other small vertebrates, mostly at night.

Wood Duck (*Aix sponsa*). Uncommonly seen throughout the year, flying by or in the ponds. They nest in tree cavities.

Turkey Vulture (*Cathartes aura*). Common to uncommon. Seen most days of the year soaring overhead.

Black Vulture (*Coragyps atratus*). Occasionally seen soaring overhead during much of the year.

Red-tailed Hawk (*Buteo jamaisicensis*). Uncommon throughout the year. They are permanent residents in Alabama.

Red-shouldered Hawk (*Buteo lineatus*). Nests in the park. Common in spring and summer.

Broad-winged Hawk (*Buteo platypterus*). Occasional. May nest in the refuge.

Northern Harrier (*Circus cyaneus*). Occasional in winter. Migrates north in spring.

Wild Turkey (*Meleagris gallopavo*). May occur in flocks or solitarily. Permanent residents throughout the state.

Spotted Sandpiper (*Actitis macularia*). Rare. No suitable habitat is present. Migrates across the state.

Mourning Dove (*Zenaida macroura*). Fairly common permanent resident.

Yellow-billed Cuckoo (*Coccyzus americanus*). Uncommon breeding birds spring and summer.

Eastern Screech Owl (*Otus asio*). Nocturnal. Reported to be uncommon throughout the year. Nests in tree cavities.

Great Horned Owl (*Bubo virginianus*). Nocturnal. Uncommon throughout the year.

Barred Owl (*Strix varia*). Mostly nocturnal. Reported uncommon throughout the year.

Chuck-will's-widow (*Caprimulgus carolinensis*). Possible spring and summer resident. Uncommon.

Chimney Swift (*Chastura pelagica*). Common spring and summer residents.

Ruby-throated Hummingbird (*Archilochus colubris*). Uncommon in spring and summer.

Belted Kingfisher (*Ceryle alcyon*). Fairly common permanent resident.

Northern Flicker (*Colaptes auratus*). Uncommon permanent resident.

Pileated Woodpecker (*Dryocopus pileatus*). Fairly common permanent resident.

Red-bellied Woodpecker (*Melanerpes carolinus*). Fairly common permanent resident.

Yellow-bellied Sapsucker (*Sphyrapicus vatus*). Uncommon fall and winter resident.

Hairy Woodpecker (*Picoides villosus*). Occasional permanent resident.

Downy Woodpecker (*Picoides pubescens*). Uncommon permanent resident.

Eastern Kingbird (*Tyrannus tyrannus*). Uncommon spring and summer.

Great Crested Flycatcher (*Myiarchus crinitus*). Common spring and summer.

Eastern Phoebe (*Sayornis phoebe*). Uncommon to common throughout the year..

Acadian Flycatcher (*Empidonax virescens*). Uncommon spring and summer resident.

Eastern Wood-Pewee (*Contopus virens*). Common spring and summer resident.

Northern Rough-winged Swallow (*Stelgidopteryx serripennis*). Uncommon spring and summer resident.

Barn Swallow (*Hirundo rustica*). Abundant spring and summer residents.

Purple Martin (*Progne subis*). Uncommon spring and summer visitor.

Blue Jay (*Cyanocitta cristata*). Common permanent resident.

American Crow (*Corvus brachyrhynchos*) Abundant permanent resident.

Carolina Chickadee (*Parus carolinensis*). Uncommon permanent resident.

Tufted Titmouse (*Parus bicolor*). Common permanent resident.

Brown-headed Nuthatch (*Sitta pusilla*). Uncommon permanent resident.

Carolina Wren (*Thyrothorus ludovicianus*). Common permanent resident.

Northern Mockingbird (*Mimus polyglottos*). Uncommon permanent resident.

Brown Thrasher (*Toxostoma rufum*). Uncommon permanent resident.

American Robin (*Turdus migratorius*). Uncommon permanent resident. Migrant flocks in winter and spring are often abundant.

Wood Thrush (*Hylocichla mustelina*). Uncommon spring and summer resident.

Hermit Thrush (*Catharus guttatus*). Common winter and spring resident.

Eastern Bluebird (*Sialia sialis*). Uncommon throughout the year.

Blue-gray Gnatcatcher (*Polioptila carulea*). Common in spring and summer.

Ruby-crowned Kinglet (*Regulus calendula*). Uncommon to common winter and early spring resident.

White-eyed Vireo (*Vireo griseus*). Uncommon resident in spring and summer.

Yellow-throated Vireo (*Vireo flavifrons*). Uncommon spring and summer resident.

Red-eyed Vireo (*Vireo olivaceus*). Common to abundant spring and summer resident.

Black and White Warbler (*Mniotilta varia*). Common spring and summer resident.

Nashville Warbler (*Vermivora ruficapilla*). Rare spring migrant.

Prothonotary Warbler (*Prothonotaria citrea*). Uncommon spring fall migrant.

Northern Parula (*Parula americana*). Uncommon spring and summer resident.

Yellow-rumped Warbler (*Dendroica coronata*). Uncommon to common winter and spring resident.

Yellow-throated Warbler (*Dendroica dominica*). Uncommon summer resident.

Pine Warbler (*Dendroica pinus*). Common permanent resident.

Prairie Warbler (*Dendroica discolor*). Uncommon spring and summer resident.

Palm Warbler (*Dendroica palmarum*). Uncommon spring migrant.

Kentucky Warbler (*Oporornis formosus*). Uncommon spring and summer resident.

Yellow-breasted Chat (*Icteria virens*). Common resident spring and summer.

Hooded Warbler (*Wilsonia citrina*). Uncommon spring and summer resident.

Red-winged Blackbird (*Agelaius phoeniceus*). Common spring visitor. May nest on the refuge.

Orchard Oriole (*Icterus spurius*). Uncommon spring and summer resident.

Scarlet Tanager (*Piranga olivacea*). Uncommon spring and summer resident.

Summer Tanager (*Piranga rubra*). Common spring and summer resident.

Northern Cardinal (*Cardinalis cardinalis*). Common permanent resident.

Blue Grosbeak (*Guiraca caerulea*). Uncommon spring and summer resident.

Indigo Bunting (*Passerina cyanea*). Uncommon spring and summer resident.

Evening Grosbeak (*Coccothraustes vespertinus*). Uncommon winter and early spring migrant.

American Goldfinch (*Carduelis tristis*). Common spring and uncommon summer resident.

Eastern Towhee (*Papilo erythrophthalmus*). Fairly common permanent resident.

Dark-eyed Junco (*Junco hyemalis*). Uncommon winter and spring migrant.

Chipping Sparrow (*Spizella passerina*). Uncommon to common throughout the year.

White-throated Sparrow (*Zonotrichia albicollis*). Common fall, winter and spring migrant.

Appendix I. Budget Requests

The refuge's budget requests are contained in the Refuge Operating Needs System (RONS) and Service Asset and Maintenance Management System (SAMMS) databases that include a wide variety of new and maintenance refuge projects. The RONS and SAMMS lists are constantly updated and include priority projects. Contact the refuge for the most current RONS and SAMMS lists. Please refer to Chapter V for the key budget requests associated with the proposed projects and staffing. Chapter V includes the proposed projects, which are linked to the applicable objectives, and Table 9, which identifies staff, first-year costs, and recurring costs for the outlined projects.

Appendix J. List of Preparers

Steve Miller – Project Leader, Mountain Longleaf NWR

Eva Kristofik – Assistant Project Leader, Mountain Longleaf NWR

Dwight Cooley – Project Leader, Wheeler NWR

Mike Dawson – FWS Contractor, Jackson, MS

Daniel Drennen – FWS Ecological Services, Jackson, MS

Ted Martin – FWS Ecological Services, Birmingham, AL

Eric Spadgenske – FWS Ecological Services, Birmingham, AL

Steve Rider – AL Division of Wildlife and Fresh Water Fisheries

Bernie Kuhajda – University of Alabama

APPENDIX K. Finding of No Significant Impact

Introduction

The U.S. Fish and Wildlife Service (Service) has developed a Comprehensive Conservation Plan (CCP) to provide a foundation for the management and use of Watercress Darter National Wildlife Refuge (NWR) over the next 15 years. An Environmental Assessment (EA) was prepared to inform the public of the possible environmental consequences of implementing the CCP for Watercress Darter NWR. 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 CCP for Watercress Darter NWR, the Service evaluated three alternatives: A, B, and C.

The Service adopted Alternative C, the “Preferred Alternative,” as the CCP for guiding the direction of Watercress Darter NWR for the next 15 years. The overriding concern reflected in this CCP is that the endangered species, watercress darter, assumes first priority in refuge management; wildlife-dependent recreational uses are allowed if they are compatible with the management of this species. Wildlife-dependent recreation uses (e.g., wildlife observation, wildlife photography, and environmental education and interpretation) will be encouraged.

ALTERNATIVE A – MAINTAIN CURRENT MANAGEMENT (NO ACTION)

Current management of Watercress Darter NWR recognizes the importance of looking beyond the refuge boundary. Open communication and partnerships with adjacent landowners and interest groups upstream and downstream from Watercress Darter NWR are important aspects of the current management strategy. The refuge continues to seek partnerships with adjacent landowners to protect and enhance the habitat for the endangered watercress darter. Current staff monitors long-term trends for exotic invasive species. Other institutions are sought to investigate topics in detail. Wildlife observation is incorporated in the current public use program. Some outreach avenues have been established at both the local and state level. The lack of resources has limited the quantity and quality of the services the refuge could provide. Watercress Darter NWR is currently managed by the staff from Mountain Longleaf NWR, which is located 90 miles to the east.

ALTERNATIVE B – REFUGE FOCUSED MANAGEMENT

This alternative would focus refuge activities internally, within the jurisdictional boundaries, to the land that is directly under the care of the Service as Watercress Darter NWR. The refuge would rely on interest groups to collect information on outside threats. Protection of the endangered watercress darter, restoration of native communities, and the health of resident wildlife species would be emphasized on refuge lands. Environmental monitoring would demonstrate long-term trends and environmental changes or the results of management practices on refuge lands. Research, management, protection, education, and public use would be conducted to maximize benefits to Watercress Darter NWR specifically. Land acquisition would be emphasized on high-priority areas within the approved acquisition boundary. This alternative would increase staff similar to Alternative C, because of the additional time and manpower needed to conduct surveys, trail maintenance, and other

management functions within the refuge. Additional staff members needed to fully implement this alternative include four positions, to be shared with Cahaba River NWR.

ALTERNATIVE C – INTEGRATED LANDSCAPE MANAGEMENT (PREFERRED ALTERNATIVE)

Threats to the refuge are becoming more prominent as development activities occur in the city of Bessemer. Watercress Darter NWR is a small system that can be greatly compromised by activities a distance away from its boundary. Through Alternative C, the staff fully recognizes the impacts these activities may have on the integrity of the refuge. The staff will continue activities as stated in Alternative A and extend beyond the immediate neighbors to address issues associated with the aquifer and spring recharge area, watershed, and biota exchange pathways. Extensive resource sharing and networking with other protected areas, state agencies, local government, organizations, specialists, researchers, and private citizens would expand the knowledge base and develop cooperation between interest groups. Restoration of natural systems, native communities, and healthy environments will be emphasized, thus promoting regionally a higher quality of life. Monitoring environmental parameters, flora and fauna will be incorporated into an integrated study to gain knowledge on the health of the refuge's ecosystem. Education and outreach will be expanded with an emphasis on cultural and historical resources including groundwater springs. Staffing will be developed to meet the needs of partners and the greater number of interest groups, and to accommodate data and resource sharing. An increase in staff is presented in this alternative so that Watercress Darter NWR can be managed with a greater emphasis on landscape management. Additional staff members needed to fully implement this alternative at the highest quality level include one position at Watercress Darter NWR and four positions shared between Cahaba River NWR and Watercress Darter NWR.

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 Watercress Darter NWR will result in increased protection for threatened and endangered species; enhanced wildlife populations; habitat restoration; and enhanced opportunities for wildlife-dependent recreation and environmental education. These effects are detailed as follows:

1. Additional staff and resources will create and properly manage the diversity of habitats found on the refuge, including limestone springs, riparian vegetation, and open water. Baseline data will be collected on populations and habitats and monitoring protocols established.
2. Quality wildlife-dependent recreational activities (e.g., wildlife observation and interpretation) will continue and environmental education programs will be enhanced. Improved interpretive and informational programs will increase awareness of the refuge and wildlife and of the mission of the National Wildlife Refuge System.
3. Cultural resources will be surveyed, documented, and protected.
4. Habitat restoration and management will result in improved wildlife-dependent recreational opportunities. While public use will 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 implementation of refuge regulations. Anticipated long-term impacts to wildlife and habitats from implementing the management action are positive. In the long term, wildlife habitats and increased opportunities for wildlife-dependent recreation opportunities could result in an increase in economic benefits to the local community.

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5. 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 will not result in development of buildings and/or structures within floodplain areas, nor will they result in irrevocable, long-term adverse impacts.

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 will take place through carefully controlled time and space zoning, establishment of protection zones around key sites, and routing of trails to avoid direct contact with sensitive areas, such as endangered species habitat. Monitoring activities through wildlife inventories and assessments of public use levels and activities will be utilized, and public use programs will 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 will 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 will not impact adjacent landowners. Future land acquisition will occur on a willing-seller basis only, at fair market values within the approved acquisition boundary. Refuge 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. The management action contains neither provisions nor proposals to pursue off-refuge stream bank riparian zone protection measures (e.g., fencing) other than on a volunteer/partnership basis.

Land Ownership and Site Development

Proposed acquisition efforts by the Service could 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

The management action has been thoroughly coordinated with all interested and/or affected parties. Parties contacted include:

- All affected landowners
- Congressional representatives
- Governor of Alabama
- Alabama Division of Wildlife and Freshwater Fisheries
- Alabama State Historic Preservation Officer
- University of Alabama
- Local community officials
- Interested citizens
- Conservation organizations

Findings

It is my determination that the management action does not constitute a major federal action significantly affecting the quality of the human environment under the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969 (as amended). As such, an environmental impact statement is not required. This determination is based on the following factors (40 C.F.R. 1508.27), as addressed in the EA for the Watercress Darter NWR:

1. Both beneficial and adverse effects have been considered and this action will not have a significant effect on the human environment. (Environmental Assessment, page 65-68)
2. The actions will not have a significant effect on public health and safety. (Environmental Assessment, page 69)
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, page 103)
4. The effects on the quality of the human environment are not likely to be highly controversial. (Environmental Assessment, page 70)
5. The actions do not involve highly uncertain, unique, or unknown environmental risks to the human environment. (Environmental Assessment, page 70)
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, page 79)
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 78)

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8. The actions will not significantly affect any site listed in, or eligible for listing in, the National Register of Historic Places, nor will they cause loss or destruction of significant scientific, cultural, or historic resources. (Environmental Assessment, page 70)
 9. The actions are not likely to adversely affect threatened or endangered species, or their habitats. (Environmental Assessment, page 74-77)
 10. The actions will not lead to a violation of federal, state, or local laws imposed for the protection of the environment. (Environmental Assessment, page 74-77)

Supporting References

Fish and Wildlife Service. 2010. Draft Comprehensive Conservation Plan and Environmental Assessment for Watercress Darter National Wildlife Refuge, Jefferson County, AL., U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region.

Document Availability

The Environmental Assessment was Section B of the Draft Comprehensive Conservation Plan for Watercress Darter National Wildlife Refuge and was made available in April 2010. Additional copies are available by writing: Mountain Longleaf NWR, P.O. Box 5087, Fort McClellan, AL 36205.



"for" _____
Cynthia K. Dohner
Regional Director, Southeast Region

SEP 21 2010

Date