

# Cahaba River National Wildlife Refuge

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## DRAFT COMPREHENSIVE CONSERVATION PLAN AND ENVIRONMENTAL ASSESSMENT



Photo credit: Paul L. Freeman







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**DRAFT COMPREHENSIVE CONSERVATION PLAN  
AND ENVIRONMENTAL ASSESSMENT FOR  
CAHABA RIVER NATIONAL WILDLIFE REFUGE**

*Bibb County, Alabama*

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

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## SECTION A. DRAFT COMPREHENSIVE CONSERVATION PLAN

### *I. Background*

#### INTRODUCTION

Cahaba River National Wildlife Refuge (NWR, refuge) straddles a 3-mile stretch of the Cahaba River in Bibb County, Alabama. The refuge was established in 2002, with an acquisition boundary of 7,784 acres; current refuge lands encompass 3,689.63 acres.

This Draft Comprehensive Conservation Plan (Draft CCP) for Cahaba River NWR combines two documents required by federal law:

- a Draft CCP required by the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Pub. L. 105-57; 111 Stat. 1253; Improvement Act).
- a Draft Environmental Assessment (Draft EA) required by the National Environmental Policy Act of 1969 (NEPA) [(42 U.S.C. 4321 et seq.; 83 Stat. 852), as amended].

This Draft CCP for Cahaba River NWR 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 that could be implemented within the 15-year planning period. This Draft CCP/EA describes the Fish and Wildlife Service's proposed plan, as well as other alternatives considered and their effects on the environment. The Draft CCP/EA will be made available to state and federal government agencies, conservation partners, and the general public for review and comment. Comments from each entity will be considered in the development of the Final CCP.

#### PURPOSE AND NEED FOR THE PLAN

The Fish and Wildlife Service (Service) proposes to develop a CCP that, in the Service's best professional judgment, best achieves the purposes, goals, and vision of the refuge and contributes to the National Wildlife Refuge System's mission, adheres to the Service's policies and other mandates, addresses identified issues of significance, and incorporates sound principles of fish and wildlife science.

NEPA regulations require us to evaluate a reasonable range of alternatives, including our proposed alternative and a "no action" alternative. The "no action" alternative can mean either (1) not actively managing the refuge, or (2) not changing its present management. In this Draft CCP, Alternative A is the latter. The socioeconomic, physical, cultural, and biological consequences of implementing each alternative are analyzed in the Draft EA. This Draft CCP/EA evaluates three alternatives that were generated with the potential to become fully developed into a Final CCP.

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Developing a CCP with partner and public involvement is vital to the success of management at every national wildlife refuge. The *purpose* of a CCP is to provide each refuge with strategic management direction for the next 15 years, by:

- stating clearly the desired future conditions for refuge habitat, wildlife, visitor services, staffing;
- explaining clearly to state agencies, refuge neighbors, visitors, and partners the reasons for management actions;
- ensuring that refuge management conforms to the policies and goals of the National Wildlife Refuge System and legal mandates;
- ensuring that present and future public uses are compatible with the purposes of the refuge;
- providing long-term continuity and direction in refuge management; and
- justifying budget requests for staffing, operating, and maintenance funds.

The *need* to develop a CCP for the refuge is three-fold:

- the National Wildlife Refuge System Improvement Act (Improvement Act) requires the Service to develop a CCP for every national wildlife refuge to help fulfill the mission of the National Wildlife Refuge System (Refuge System).
- Cahaba River NWR has a Conceptual Management Plan that was developed in early 2002, and an updated plan is needed to ensure strategic management of the refuge. Furthermore, the refuge environment continues to change. For example, the economy has changed, pressures for public access have continued to grow, and new ecosystem and species conservation plans bearing directly on refuge management have been developed.
- the refuge has developed strong partnerships vital for its continued success, and the vision for the refuge must be conveyed to those partners and the public. A vision statement, goals, objectives, and management strategies are all necessary for successful refuge management. The CCP planning process incorporates input from the natural resource agencies of Alabama, affected communities, individuals and organizations, Service partners, and the public. Public and partner involvement throughout the planning process will also help the Service resolve various management issues and public concerns.

These reasons underscore the need for the strategic direction a CCP provides. The Final CCP will be reviewed, evaluated, and subsequently updated at least every 15 years in accordance with Service and Refuge System policies.

## **FISH AND WILDLIFE SERVICE**

The Service traces its roots to 1871 and the establishment of the Commission of Fisheries involved with research and fish culture. The once-independent commission was renamed the Bureau of Fisheries and placed under 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.

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

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The Fish and Wildlife Service, working with others, is responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people through Federal programs relating to migratory birds, endangered species, interjurisdictional fish and marine mammals, and inland sport fisheries (142 DM 1.1).

As of September 30, 2013, the Refuge System included 561 national wildlife refuges, 209 waterfowl production area counties (managed by 38 wetland management districts), and 50 coordination areas, spanning more than 150 million acres (60.7 million ha).

As part of its mission, the Service manages 561 national wildlife refuges and other units of the Refuge System covering 150 million acres (60.7 million ha) (as of September 30, 2013). These areas comprise the Refuge System, the world's largest collection of lands and waters set aside specifically for fish and wildlife. The majority of these lands, 77 million acres (31 million ha), is in Alaska, while 54 million acres (21.8 million ha) are part of three marine national monuments in the Pacific Ocean. The remaining acres/hectares are spread across the other 49 states and several United States territories. In addition to national wildlife refuges, the Service manages thousands of small wetlands, 38 wetland management districts (which manage 209 waterfowl production area counties), 70 national fish hatcheries, 65 fishery resource offices, 6 national monuments, and 81 ecological services field stations. The Service enforces federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies.

## **NATIONAL WILDLIFE REFUGE SYSTEM**

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

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

The Improvement Act established, for the first time, a clear legislative mission of wildlife conservation for the 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. Wildlife refuges are home to more than 700 species of birds, 220 species of mammals, 250 species of reptiles and amphibians, and more than 200 species of fish. Fifty-nine refuges have been established with a primary purpose of conserving threatened or endangered species. While 280 of the 1,200-plus federally listed threatened or endangered species in the United States are found on units of the Refuge System.

National wildlife refuges connect visitors to their natural resource 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 2013: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation*, approximately 46.5 million people visited national wildlife refuges in Fiscal Year 2011, generating almost \$2.4 billion in total economic activity and creating almost 35,000 private sector jobs producing about \$732.7 million in employment income (Carver and Caudill 2013). For 2011, about 72 percent of total expenditures were generated by non-consumptive activities on national wildlife refuges, while fishing accounted for 21 percent and hunting accounted for 7 percent (Carver and Caudill 2013). Further, local residents accounted for 23 percent of expenditures, while non-local visitors accounted for 77 percent of expenditures (Carver and Caudill 2013). Recreational spending on national wildlife refuges rose to \$342.9 million in 2011 tax revenue from 185.3 million in 2006 tax revenue at the local, county, state, and federal level (Carver and Caudill 2013).

As the number of visitors grows, substantial economic benefits are realized by local communities. In 2006, 87 million people, 16 years and older, fished (30 million), hunted (12.5 million), or observed wildlife (71 million), generating \$120 billion (U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, U.S. Census Bureau 2006). In a study completed in 2002 on 15 national wildlife refuges, visitation had grown 36 percent in 7 years. At the same time, the number of jobs generated in surrounding communities grew to 120 per national wildlife refuge, up from 87 jobs in 1995, pouring more than \$2.2 million into local economies. The fifteen national wildlife refuges in the study were Chincoteague (Virginia); National Elk (Wyoming); Crab Orchard (Illinois); Eufaula (Alabama); Charles M. Russell (Montana); Umatilla (Oregon); Quivira (Kansas); Mattamuskeet (North Carolina); Upper Souris (North Dakota); San Francisco Bay (California); Laguna Atacosa (Texas); Horicon (Wisconsin); Las Vegas (New Mexico); Tule Lake (California); and Tensas River (Louisiana) the same NWRs identified for the 1995 study. Other findings also validate the belief that communities near national wildlife refuges benefit economically. Expenditures on food, lodging, and transportation grew to \$6.8 million per national wildlife refuge, up 31 percent from \$5.2 million in 1995. For each federal dollar spent on the Refuge System, surrounding communities benefited with \$4.43 in recreation expenditures and \$1.42 in job-related income (Caudill and Laughland, unpublished).



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data). In 2011, expenditures by hunters, anglers, and wildlife recreationists were \$145 billion, which is about 1 percent of gross domestic product (USFWS 2012a).

The economic impacts of the Refuge System continue to grow; volunteer hours, Refuge System visitation, and associated economic activity have all increased. Volunteers continue to be a major contributor to the success of the Refuge System. During Fiscal Year 2012 (October 1, 2011 – September 30, 2012), 56,133 volunteers donated nearly 2.2 million hours; the value of their labor was nearly \$47 million, which is the equivalent of 1,036 full-time employees (USFWS 2013a). Further, more than 230 Friends organizations also support the work of the Service (USFWS 2013a). Refuge System visitation has grown with over 47 million visitors in 2012 (U.S. Department of the Interior 2013). Visitors to Refuge System units include an estimated 35 million who observe and photograph wildlife, an estimated 9 million who hunt and fish, and an estimated 675,000 teachers and students who use Refuge System units as outdoor classrooms (USFWS 2012a *in* Dietsch et al. 2013). According to Department of the Interior economic contributions reports, in 2010 Refuge System units generated more than \$3.98 billion in economic activity and created more than 32,000 private sector jobs nationwide (U.S. Department of the Interior 2011), while by 2012 these numbers had risen to \$4.5 billion in economic activity and 37,000 jobs supported (U.S. Department of the Interior 2013).

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 Service policies, guidelines, and planning documents (602 FW 1.1).

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## 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. Select legal summaries of treaties and laws relevant to administration of the Refuge System and management of the Cahaba River NWR are provided in Appendix C.

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 Cahaba River NWR and other partners, such as the Talladega National Forest, Alabama Forestry Commission, Alabama Department of Conservation and Natural Resources, Alabama Aquatic Biodiversity Center, The Nature Conservancy of Alabama, Cahaba River Society, Friends of Cahaba River NWR, University of Alabama, Tribes, 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. These uses are: 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.

### **Policy on Refuge System Planning (602 FW 1, 2, and 3)**

This policy establishes the requirements and guidance for Refuge System planning, including CCPs and step-down management plans. It states that all refuges will be managed in accordance with an approved CCP that, when implemented, will help:

- achieve refuge purposes;
- fulfill the Refuge System mission;
- maintain and, where appropriate, restore the ecological integrity of each refuge and the Refuge System;

- 
- achieve the goals of the National Wilderness Preservation System and the National Wild and Scenic Rivers System; and
  - conform to other mandates.

The planning policy provides guidance, systematic direction, and minimum requirements for developing all CCPs, and provides a systematic decision-making process that fulfills those requirements. Among them, we are to review any existing special designation areas or the potential for such designations (e.g., wilderness) and incorporate a summary of those reviews into each CCP (602 FW 3).

The Improvement Act stipulates that each CCP “shall identify and describe:

- the purposes of each refuge comprising the planning unit ;
- the distribution, migration patterns, and abundance of fish, wildlife, and plant populations and related habitats within the planning unit;
- the archaeological and cultural values of the planning unit;
- such areas within the planning unit that are suitable for use as administrative sites or visitor facilities;
- significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants within the planning unit and the actions necessary to correct or mitigate such problems; and
- opportunities for compatible wildlife-dependent recreational uses.”

### **Biological Integrity, Diversity, and Environmental Health Policy**

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

### **Policy on Appropriate Refuge Uses**

Federal law and Service policy provide the direction and planning framework for protecting the Refuge System from inappropriate, incompatible, or harmful human activities and ensuring that visitors can enjoy its lands and waters. This policy (603 FW 1) provides a national framework for determining appropriate refuge uses in an effort to prevent or eliminate those uses that should not occur in the Refuge System. It describes the initial decision process the refuge manager follows when considering whether or not to allow a proposed use on a refuge. An appropriate use must meet at least one of the following four conditions: (1) The use is a wildlife-dependent recreational use as identified in the Improvement Act; (2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997; (3) The use involves the take of fish and wildlife under State regulations; and (4) The use has been found to be appropriate after concluding a specified findings process using 10 criteria.

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This policy is available online at <http://www.fws.gov/policy/library/06-5645.pdf>

### **Policy on Compatibility**

This policy (603 FW 2) complements the appropriateness policy. The refuge manager must first find that a use is appropriate before undertaking a compatibility review of that use. If the proposed use is not appropriate, the refuge manager will not allow the use and will not prepare a compatibility determination.

This policy and its regulations, including a description of the process and requirements for conducting compatibility reviews, can be viewed online at <http://policy.fws.gov/library/00fr62483.pdf>

In summary:

- The Improvement Act and its regulations require an affirmative finding by the refuge manager on the compatibility of a public use before it can be allowed on a national wildlife refuge.
- A compatible use is one “that will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge.”
- The six wildlife-dependent uses that are to receive enhanced consideration on refuges are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.
- The refuge manager may authorize those priority uses on a refuge when they are compatible and consistent with public safety.
- When the refuge manager publishes a compatibility determination, it will stipulate the required maximum reevaluation dates: 15 years for wildlife-dependent recreational uses or 10 years for other uses.
- However, the refuge manager may reevaluate the compatibility of any use at any time: for example, sooner than its mandatory date, or even before completion of the CCP process, if new information reveals unacceptable impacts or incompatibility with refuge purposes (602 FW 2.11, 2.12).
- The refuge manager may allow or deny any use, even one that is compatible, based on other considerations such as public safety, policy, or available funding.

### **Wildlife-Dependent Recreation Policy**

The Improvement Act defines and establishes that the six compatible wildlife-dependent recreational uses listed above are the priority general public uses of the Refuge System and will receive enhanced and priority consideration in refuge planning and management over other general public uses. The Wildlife Dependent Recreation Policy (605 FW 1 through 7) explains how the refuge will provide visitors with opportunities for those priority public uses on units of the Refuge System and how those uses will be facilitated.

### **Native American Policy**

The Service developed and adopted a Native American Policy in 1994. The Service’s intent in creating this policy is to: “...help accomplish its mission and concurrently to participate in fulfilling the Federal Government’s and the Department of the Interior’s trust responsibilities to assist Native Americans in protecting, conserving, and utilizing their reserved, treaty guaranteed, or statutorily identified trust assets. This policy is consistent with federal policy supporting Native American government self-determination. The Service has a long history of working with Native

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American governments in managing fish and wildlife resources. These relationships will be expanded, within the Service's available resources, by improving communication and cooperation, providing fish and wildlife management expertise, training and assistance, and respecting and utilizing the traditional knowledge, experience, and perspectives of Native Americans in managing fish and wildlife resources."

### **Other Mandates**

Although Service and Refuge System policies and the purposes of each refuge provide the foundation for its management, other federal laws, executive orders, treaties, interstate compacts, and regulations on conserving and protecting natural and cultural resources also affect how refuges are managed. A centralized library of Service-wide policies, executive orders, director's orders, and the "Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service" is available online at <http://www.fws.gov/policy/>.

### ***The National Historic Preservation Act***

Federal laws also require the Service to identify and preserve its important historic structures, archaeological sites, and artifacts. NEPA mandates the consideration of cultural resources in planning federal actions. Furthermore, the Improvement Act requires that the CCP for each refuge identify its archaeological and cultural values.

The National Historic Preservation Act (NHPA) (Pub. L. 102–575; 16 U.S.C. 470) requires federal agencies to locate and protect historic resources—archaeological sites and historic structures eligible for listing or listed in the National Register of Historic Places and museum property—on their land or on land affected by their activities. It also requires agencies to establish a program for those activities and carry them out in consultation with State Historic Preservation Offices (SHPOs).

The NHPA also charges federal agencies with locating, evaluating, and nominating sites on their land to the National Register of Historic Places. An inventory of known archaeological sites and historic structures is maintained within our region (Southeast Region) and file copies of the sites are located at each refuge. A regional historic preservation officer oversees compliance with the NHPA and consultations with SHPOs. The Service must also comply with the Archaeological Resources Protection Act (Pub. L. 96–95, 16 U.S.C.470aa-mm). It requires the protection of archaeological sites from vandalism or looting and site excavation permitting.

### ***The Wilderness Act***

The Wilderness Act of 1964 (16 U.S.C. 1131–1136; Public Law 88–577) establishes a National Wilderness Preservation System (NWPS) that is composed of federally owned areas designated by Congress as "wilderness areas." The act directs each agency administering designated wilderness to preserve the wilderness character of areas within the NWPS, and to administer the NWPS for the use and enjoyment of the American people in a way that will leave those areas unimpaired for future use and enjoyment as wilderness. The act also directs the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 acres or more and every roadless island (regardless of size) within the Refuge System and National Park System for inclusion in the NWPS. Service planning policy requires that we evaluate the potential for wilderness on refuge lands, as appropriate, during the CCP planning process (610 FW 1).

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### ***The Endangered Species Act***

The Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884) 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.

The Draft CCP/EA evaluates for compliance with the cultural and historic laws cited above, as well as the Clean Water Act.

### **NATIONAL AND INTERNATIONAL CONSERVATION PLANS AND INITIATIVES**

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

#### ***STRATEGIC HABITAT CONSERVATION***

The Service has a goal of establishing and building capacity for science-driven landscape conservation on a continental scale. Also known as Strategic Habitat Conservation (SHC), this approach applies adaptive resource management principles to the entire range of species, groups of species, and natural communities of vegetation and wildlife. This approach is founded on an adaptive, iterative process of biological planning, conservation design, conservation delivery, monitoring, and research. The Service is refining this approach to conservation in a national geographic framework. The Service will work with partners to develop national strategies to help at-risk wildlife adapt in a climate-changed world. This geographic frame of reference will also allow us to more precisely explain to partners, Congress, and the American public as to why, where, and how we target resources for landscape-scale conservation and how our efforts connect to a greater whole. The Cahaba River NWR will contribute to SHC of the southeast through protection of existing habitat, and habitat restoration or manipulation.

#### ***NORTH AMERICAN BIRD CONSERVATION INITIATIVE.***

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

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## NORTH AMERICAN WATERFOWL MANAGEMENT PLAN

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

Originally written in 1986, NAWMP describes a 15-year strategy promulgated by the United States, Canada, and Mexico to restore and sustain waterfowl populations by protecting, restoring, and enhancing habitat. The plan committee, including representatives from each nation, has modified the 1986 plan twice to account for biological, sociological, and economic changes that influenced the status of waterfowl and the conduct of cooperative habitat conservation. The most recent modification (USFWS 2004a) updates the needs, priorities, and strategies for the next 15 years, increases stakeholder confidence in the direction of its actions, and guides partners in strengthening the biological foundation of North American waterfowl conservation.

## PARTNERS-IN-FLIGHT BIRD CONSERVATION PLAN

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 (PIF) in 1990. PIF began as a voluntary, international coalition of government agencies, conservation organizations, academic institutions, private industries, and citizens dedicated to reversing the population declines of bird species. The missions of PIF are to help species at risk, keep common birds common, and encourage voluntary partnerships for birds, habitats, and people (Rich et al. 2004). The foundation of PIF's long-term strategy is a series of scientifically based bird conservation plans using physiographic areas as planning units. The goal of each PIF plan is to ensure the long-term maintenance of healthy populations of native birds, primarily non-game species. The plan for each physiographic area ranks bird species according to their conservation priority, describes their desired habitat conditions, develops biological objectives, and recommends conservation measures. The priority ranking factors are habitat loss, population trends, and the vulnerability of a species and its habitats to regional and local threats. The refuge lies on the boundary of the Southern Ridge and Valley (Physiographic Area 13) and East Gulf Coastal Plain (Physiographic Area 4).

Although a PIF plan has not been developed for the Southern Ridge and Valley area, the website does list priority species and habitats, several of which are found on the refuge. For instance, the refuge contains a variety of habitats, ranging from bottomland hardwoods to longleaf pine communities, which supports various priority bird species (PIF 2011). Over half of the PIF 13 priority bird species likely breed on the refuge, including Kentucky warbler (*Oporornis formosus*), prairie warbler (*Dendroica discolor*), prothonotary warbler (*Protonotaria citrea*), Swainson's warbler (*Limnothlypis swainsonii*), worm-eating warbler (*Helmitheros vermivorus*), yellow-throated warbler (*Dendroica dominica*), Acadian flycatcher (*Empidonax vireescens*), brown-headed nuthatch (*Sitta pusilla*), orchard oriole (*Icterus spurius*), and wood thrush (*Hylocichla mustelina*) (USFWS 2007).

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The PIF Bird Conservation Plan for the East Gulf Coastal Plain area lists several conservation recommendations and priority bird species. Bird species that rank high in the PIF plan and are supported by the refuge include several of those listed for the Southern Ridge and Valley area. Additional birds include: golden-winged warbler, red-headed woodpecker, northern bobwhite, orchard oriole, and chuck-will's-widow (PIF 2012).

#### *U.S. SHOREBIRD CONSERVATION PLAN*

Concerns about shorebirds led to the creation of the U.S. Shorebird Conservation Plan in 2000; a second edition was published in May 2001 (Brown et al. 2001). The U.S. Shorebird Conservation Plan is a partnership effort throughout the United States to ensure that stable and self-sustaining populations of shorebird species are restored and protected. The plan was developed by a wide range of agencies, organizations, and shorebird experts for separate regions of the country, and identifies conservation goals, critical habitat conservation needs, key research needs, and proposed education and outreach programs to increase awareness of shorebirds and the threats they face. The refuge lies in the Southeastern Coastal Plains-Caribbean Region, for which a specific shorebird plan has been developed (Hunter et al. 2002).

#### *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);

#### *NORTHERN AMERICAN WATERBIRD CONSERVATION PLAN*

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



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## *AMERICA'S GREAT OUTDOORS: A PROMISE TO FUTURE GENERATIONS*

In April 2010, the President announced the America's Great Outdoors (AGO) initiative to develop a 21<sup>st</sup> century conservation and recreation agenda. As part of this initiative, a report was developed that outlines various goals and objectives in pursuit of AGO's vision. The report contains three chapters: Connecting Americans to the Great Outdoors; Conserving and Restoring America's Great Outdoors, and Working Together for America's Great Outdoors (Department of the Interior, Environmental Protection Agency, Department of Agriculture, and Council on Environmental Quality 2011). When final, the CCP will contribute to several of the goals and objectives outlined in the AGO, including the need to increase recreational outdoor opportunities, the need to work to conserve and restore public lands, and the need to protect and renew rivers.

## *STRATEGIC PLAN FOR RESPONDING TO ACCELERATING CLIMATE CHANGE*

The Service's climate change strategy, titled "Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change" (USFWS 2010), establishes a basic framework within which the Service will work as part of the larger conservation community to help ensure the sustainability of fish, wildlife, plants, and habitats in the face of accelerating climate change. The plan is implemented through a dynamic action plan that details specific steps the Service will take during the next five years to implement the Strategic Plan. Developed during 18 months of intensive work and thorough discourse within the agency and input from the public, the plan employs three key categories to address climate change: Adaptation, Mitigation, and Engagement. Components of each of these categories will be incorporated in the Draft CCP/EA.

## **STATE AND REGIONAL CONSERVATION PLANS AND INITIATIVES**

### *LANDSCAPE CONSERVATION COOPERATIVES*

Landscape Conservation Cooperatives (LCCs) are applied science and management partnerships initiated by bureaus within the Department of the Interior and others involved in natural resource conservation and management. Secretarial Order No. 3289, issued in 2009 by Interior Secretary Ken Salazar, calls for the establishment of a seamless nationwide network to better integrate science and management to address landscape-level stressors and drivers of change including the changing climate. The definition of this network was based on a 2009 joint Service and U.S. Geological Survey team formulation of geographic framework that appropriately aggregated Bird Conservation Regions for landscape-scale biological planning and conservation design for both terrestrial and aquatic species. The resulting National Geographic Framework identified large regions that crossed state and federal administrative boundaries. There are currently twenty-two Landscape Conservation Cooperatives or LCCs that make up the National LCC Network.

LCCs provide scientific and technical support for conservation at "landscape" scales—the entire range of an identified priority species or groups of species. They support biological planning, conservation design, prioritizing and coordinating research, and designing species inventorying and monitoring programs. LCCs also have a role in helping partners identify common goals and priorities to target the right science in the right places for efficient and effective conservation. By functioning as a network of interdependent units rather than independent entities, LCC partnerships can accomplish a conservation mission no single agency or organization can accomplish alone.

Collectively, LCCs will compose a seamless national network supporting landscapes capable of sustaining abundant, diverse, and healthy populations of fish, wildlife, and plants. They will provide a strong link between science and conservation delivery without duplicating existing

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partnerships or creating burdensome and unnecessary bureaucracy. Rather than create a new conservation infrastructure from the ground up, LCCs build upon explicit biological management priorities and objectives, and science available from existing partnerships, such as fish habitat partnerships, migratory bird joint ventures and flyway councils, as well as species- and geographic-based partnerships.

LCCs support adaptive resource management by evaluating implementation of conservation strategies, maintaining and sharing information and data, and improving products as new information becomes available. Shared data platforms serve multiple purposes, including the collaborative development of population/habitat models under alternative climate scenarios to inform spatially explicit decision support for all partners. Decision-support systems and products developed by LCCs not only help determine the most effective conservation actions to support shared priorities, but also provide tools to compare and contrast the implications of management alternatives.

In the face of accelerated climate change and other 21st-Century conservation challenges, LCCs will regularly evaluate the effectiveness of scientific information and conservation actions and support necessary adjustments as new information becomes available. This iterative process of information sharing will help scientists and resource managers deal with uncertainties on the landscape and provide tools to compare and contrast the implications of management alternatives.

The refuge lies in the Appalachian LCC, which spans a total of 15 states; from southern New York from the Hudson River down along the Appalachian Mountains to the northern forested areas of Alabama, Georgia, and South Carolina. It extends westward to the central hardwoods of Tennessee, Kentucky, and parts of Indiana and Illinois, including the two major river drainage basins that flow into the Ohio River Basin (see Figure 1). The Appalachian LCC is administered through the Service's Region 5 Office (Hadley, Massachusetts) and field efforts are coordinated from Virginia Tech University (Blacksburg, Virginia).

Appalachia faces increasing conservation challenges, including:

- wholesale loss and fragmentation of natural habitats; genetic isolation of species;
- increasing threats associated with wildfire and change in natural disturbance regimes;
- dramatic changes in the water cycle with an increased risk of flooding as well as water scarcity; and
- the expansion of harmful invasive species.

Many of these threats will be exacerbated by the effects of expanding and emerging land-use changes and a changing climate (Appalachian Landscape Conservation Cooperative 2015).

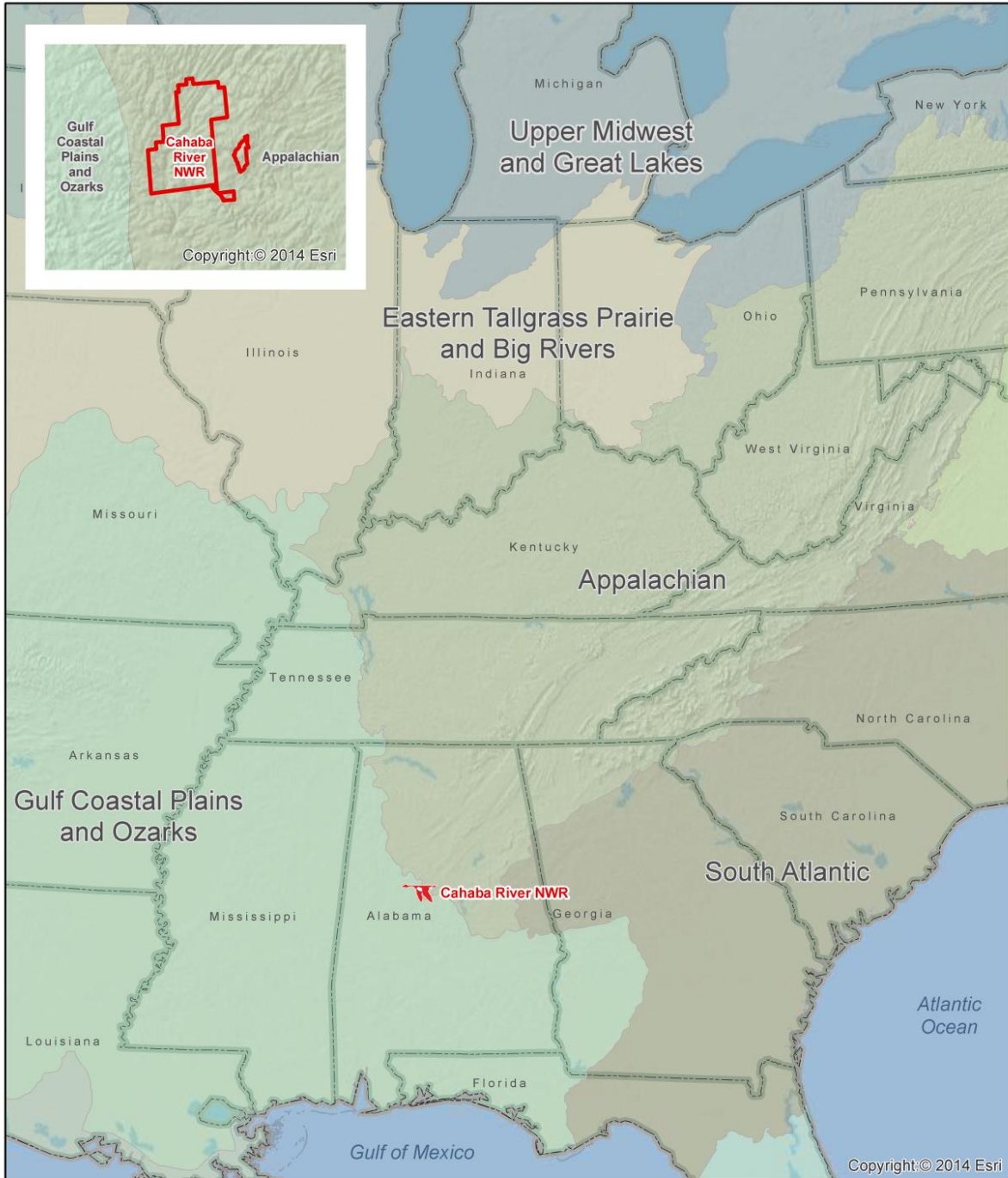
The refuge is also located very close to the Gulf Coastal Plains and Ozarks LCC (Figure 1), which includes 180 million acres, with habitats ranging from the mountain tops of the Ozark, Boston, and Ouachita ranges, to the pine savanna and prairies of the West and East Coastal Plains, down into the swamps, bayous, and alluvial bottomlands of the Mississippi River and its tributaries, and along the beachfronts and shorelines of the northeast Gulf Coast (Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative 2015).

**Figure 1. Landscape conservation cooperatives relative to Cahaba River NWR**



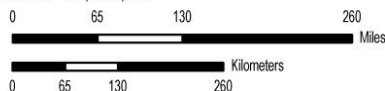
**U.S. Fish & Wildlife Service**  
**Cahaba River National Wildlife Refuge**  
 Bibb County, Alabama

*Landscape Conservation Cooperative*



Produced for the Division of Planning  
 Current to June 2014  
 Basemap: ArcGIS Online 2014

Scale: 1:8,000,000



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## ALABAMA COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY

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

The Alabama Department of Conservation and Natural Resources (ADCNR) provides management and protection for the state's fish and wildlife resources through conservation enforcement officers in each county statewide and through fisheries and wildlife biologists. ADCNR's major goal is to promote stewardship and enjoyment of Alabama's natural resources, both for present and future generations. It is responsible for freshwater fish, wildlife, marine resources, waterway safety, state lands, state parks, and other natural resources. ADCNR manages 24 state parks, 23 fishing lakes, 3 fish hatcheries, 2 waterfowl refuges, 2 wildlife sanctuaries, 34 wildlife management areas, and a mariculture center. It has responsibility for more than 645,000 acres of trust lands set aside for wildlife purposes.

The state's participation and contribution throughout this planning process will provide for ongoing opportunities and open dialogue to improve the ecological sustainment of fish and wildlife in the state of Alabama. An essential part of comprehensive conservation planning is integrating common mission objectives where appropriate.

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. The Comprehensive Wildlife Conservation Strategy (CWCS) identifies the Upper Cahaba River and tributaries (above Fall Line, including Schultz, Caffey, and Little Schultz creeks) as Priority areas for priority conservation action.

Upon review of Alabama's CWCS, the Service identified four broad objectives for this Draft CCP/EA 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 understanding by the general public and conservation stakeholders regarding species of conservation concern and their related habitats; and
- Improve existing partnerships and develop new partnerships between ADWFF and state and federal natural resource agencies, non-governmental organizations and environmental groups, private industry, and academia.

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The Alabama CWCS also identified the highest priority conservation actions that are needed and key partnerships that should be developed in order to protect many of the imperiled species found in the Cahaba River. These actions include:

- support full implementation of the Cahaba River Basin Management Plan and the Mobile Basin Recovery Plan;
- improve water quality and habitat quality throughout the basin, support habitat and riparian restoration where needed by ADEM, AFC, National Resources Conservation Service (NRCS), local governments, Cahaba River Society, Clean Water Partnership, and other partners;
- support expansion of the Cahaba River NWR to fulfill its acquisition boundaries by working with the Service, Forever Wild, TNC, and other partners;
- conduct population augmentation and/or reintroduction to suitable habitats to maintain their viability, beginning with the Cockle Elimia and Princess Elimia;
- avoid inter-basin transfer of crayfishes because nonnative species can rapidly increase in population and aggressively displace native species; and
- conduct population augmentation and/or reintroduction to suitable habitats to maintain their viability of Alabama sturgeon, blue shiner, bluenose shiner, Cahaba shiner, coal darter, and goldline darter.

#### *RANGE-WIDE CONSERVATION PLAN FOR LONGLEAF PINE*

Longleaf pine forests originally covered 92 million acres across the southeastern United States. These forests stretched from southeastern Virginia to Texas and have been referred to as the keystone of the southeastern landscape. Today, less than 3 million acres remain and the forest is recognized as a critically endangered ecosystem, with loss of over 98 percent of its original range. Intensive logging, conversion to agriculture and commercial forests, and other land use changes caused the greatest losses of this habitat. Fire-suppression has further degraded remaining stands, as this species is a poor competitor, and in the absence of periodic fires, hardwoods take over (Outcalt and Sheffield 1996). Additionally, longleaf pine forest in its original fire-maintained condition has been recognized as perhaps the rarest community type in the southeastern United States (Noss et al. 1995).

Under the leadership of the USDA Forest Service, Department of Defense, and the Service, a Regional Working Group of diverse organizations was formed in October 2007 to develop America's Longleaf. A Steering Committee of the Regional Working Group was tasked with developing a "Range-wide Conservation Plan for Longleaf Pine" and launching the America's Longleaf Initiative as an umbrella for the collaborative efforts by many stakeholders to ensure the Conservation Plan's implementation. The Initiative was also intended as a vehicle for raising the profile of longleaf as a conservation concern, regionally and nationally, and for generating broad public support. The Range-wide Conservation Plan for Longleaf Pine was developed with review and input of more than 120 resource professionals and is intended to guide efforts by participating agencies, organizations, and individuals (Regional Working Group for America's Longleaf 2009). The CCP, when final, will contribute towards several goals and objectives outlined in the Longleaf Plan for protecting and maintaining longleaf habitat.

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## *CAHABA RIVER BASIN MANAGEMENT PLAN*

In 2002, the Alabama Department of Environmental Management developed the Cahaba River Basin Management Plan (ADEM 2002). The purpose of the ADEM was to develop a system-wide approach to protecting and improving water quality. Major threats to the basin are primarily in the upper watershed, as that is the area with the highest population density. Water quality impacts throughout the basin were determined to be most likely associated with three major stressor or pollutant categories: sediment, nutrients, and toxic substances. Rapid development and associated construction activities in the basin are a major contributor of sediment to basin waterways through stormwater runoff. In addition to existing regulations to control stormwater runoff, ADEM recommended training requirements for the construction industry. Removal of riparian vegetation, stream bank modifications, and bank erosion were noted as other sources of sedimentation. Nutrient sources were believed to be primarily associated with turf management, sanitary sewer overflows, and failed septic systems. To help reduce nutrient input to the Cahaba River and its tributaries, the plan recommended public education information be distributed to communities and commercial property owners regarding soil testing and the proper rates of application of fertilizers, as well as information pertaining to impacts from nuisance levels of nutrients in watershed streams. Sources of toxic substances were identified and included urban runoff, turf management, industrial releases, landfills, and mining operations. Various actions were proposed to help reduce these impacts, ranging from educational outreach to ensuring compliance under existing regulations (ADEM 2002). The CCP, when final, will contribute to several strategies listed in the basin's management plan to reduce nonpoint source pollution.

## *SOUTHEAST AQUATIC HABITAT PLAN*

The Southeast Aquatic Resources Partnership (SARP) is a regional collaboration of natural resource and science agencies, conservation organizations, and private interests developed to strengthen the management and conservation of aquatic resources in the southeastern United States. In 2008, SARP developed the Southeast Aquatic Habitat Plan (Southeast Aquatic Resources Partnership 2008), which aims to guide partners' projects to conserve southeastern aquatic habitats. Four pilot river basin conservation plans were initially developed to serve as models for the development of SAHP. Waterbodies were then prioritized and mapped using the Geographic Information System, based upon information from the State Wildlife Action Plans, the conservation plans, and other regional and national data. According to SARP, this prioritization process allows the comparison of the locations of aquatic habitats in the region with greatest need of restoration or conservation, with the strongest ecological systems, and with the greatest potential for ecological and economic impact. Where implemented, objectives were developed to help improve, establish, or maintain riparian zones, water quality, watershed connectivity, sediment flow, bottoms and shorelines, coastal, estuarine and marine zones, as well as to control hydrologic conditions and invasive or problem species. On a larger scale, the Habitat Plan is intended to help SARP identify regional priorities and facilitate action for aquatic conservation and restoration. This CCP, when final, will support several of the objectives related to protecting and maintaining freshwater habitats and riparian zones, as outlined in the SARP.

## *CONSERVING THE FUTURE: WILDLIFE REFUGES AND THE NEXT GENERATION*

In 2010, the Service initiated efforts to develop a new strategic vision for the Refuge System. This new vision acknowledges the broad social, political, and economic changes that have made habitat conservation more challenging since the agency last set comprehensive goals in 1999. In the intervening 12 years, the new vision states the nation's population has grown "larger and more diverse ... and the landscape for conservation has changed—there is less undeveloped land, more

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invasive species, and we are experiencing the impacts of a changing climate.” As part of an open process, the Service launched an online conversation about conservation starting in fall 2010 to distill the new Refuge System vision. The 24 final recommendations incorporate extensive suggestions from the public, conservation organizations, state wildlife agencies, and Service employees. To implement the new vision, nine Implementation Teams have been established: Urban Wildlife Refuges; Strategic Growth; the Leadership Development Council; Planning; Science; Community Partnerships; Communications; Hunting, Fishing, and Outdoor Recreation; and Interpretation and Education (USFWS 2011a).

## RECOVERY PLANS

Service recovery plans are documents describing protocols for protecting and enhancing threatened and endangered species populations with the aim of eventually removing the species from the federal endangered species list. Recovery plans for the following species were referenced as part of developing the Draft CCP/EA:

- fine-lined pocketbook (*Lampsilis altilis* since renamed to *Hamiota altilis*; Roe and Hartfield 2005) (USFWS 2000)
- triangular kidneyshell (*Ptychobranthus greenii*) (USFWS 2000)
- round rocksnail (*Leptoxis ampla*) (USFWS 2005a)
- flat pebblesnail (*Lepyrium showalteri*) (USFWS 2005a)
- cylindrical lioplax (*Lioplax cyclostomaformis*) (USFWS 2005a)
- Cahaba shiner (*Notropis cahabae*) (USFWS 1992)
- blue shiner (*Cyprinella caerulea*) (USFWS 1995)
- goldline darter (*Percina aurolineata*) (USFWS 2000)
- gray bat (*Myotis grisecens*) (USFWS 1982)
- Mohr’s Barbara’s-Button (*Marshallia mohrii*) (USFWS 1991)
- Gentian pinkroot (*S. gentianoides* var. *alabamensis*) (USFWS 2012b)





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## II. Refuge Overview

### INTRODUCTION

#### REFUGE HISTORY AND PURPOSE

Cahaba River NWR was established in 2002 under the authority of The Cahaba River National Wildlife Refuge Establishment Act, Public Law No. 106-331, passed on October 19, 2000. This legislation directed the Secretary of the Interior to acquire up to 3,500 acres of lands and waters within the boundaries of the refuge. In 2004, the Regional Director of the Service (Southeast Region) authorized the expansion of the acquisition boundary of the refuge to include an additional 330 acres at the confluence of the Cahaba and Little Cahaba rivers. In 2006, Public Law 109-363 was signed by the President, authorizing the further expansion of the acquisition boundary by 3,600 acres. In 2008, the Regional Director (Southeast Region) authorized the expansion of the acquisition boundary of the refuge by an additional 354 acres. The refuge currently contains 3,681 acres in Bibb County, with an approved acquisition boundary of 7,784 acres (Figure 2). The purposes under which this refuge was established are as listed:

In administering the refuge, the Secretary shall (1) conserve, enhance, and restore the native aquatic and terrestrial community characteristics of the Cahaba River (including associated fish, wildlife, and plant species); (2) conserve, enhance, and restore habitat to maintain and assist in the recovery of animals and plants that are listed under the Endangered Species Act of 1973 (16 U.S.C. 1331 et seq.); (3) in providing opportunities for compatible fish- and wildlife-dependent recreation, ensure that hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are the priority general public uses of the refuge, in accordance with section 4(a)(3) and of the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668ee (a) (3), (4)); and (4) encourage the use of volunteers and to facilitate partnerships among the United States Fish and Wildlife Service, local communities, conservation organizations, and other non-Federal entities to promote public awareness of the resources of the Cahaba River National Wildlife Refuge and the National Wildlife Refuge System and public participation in the conservation of those resources.

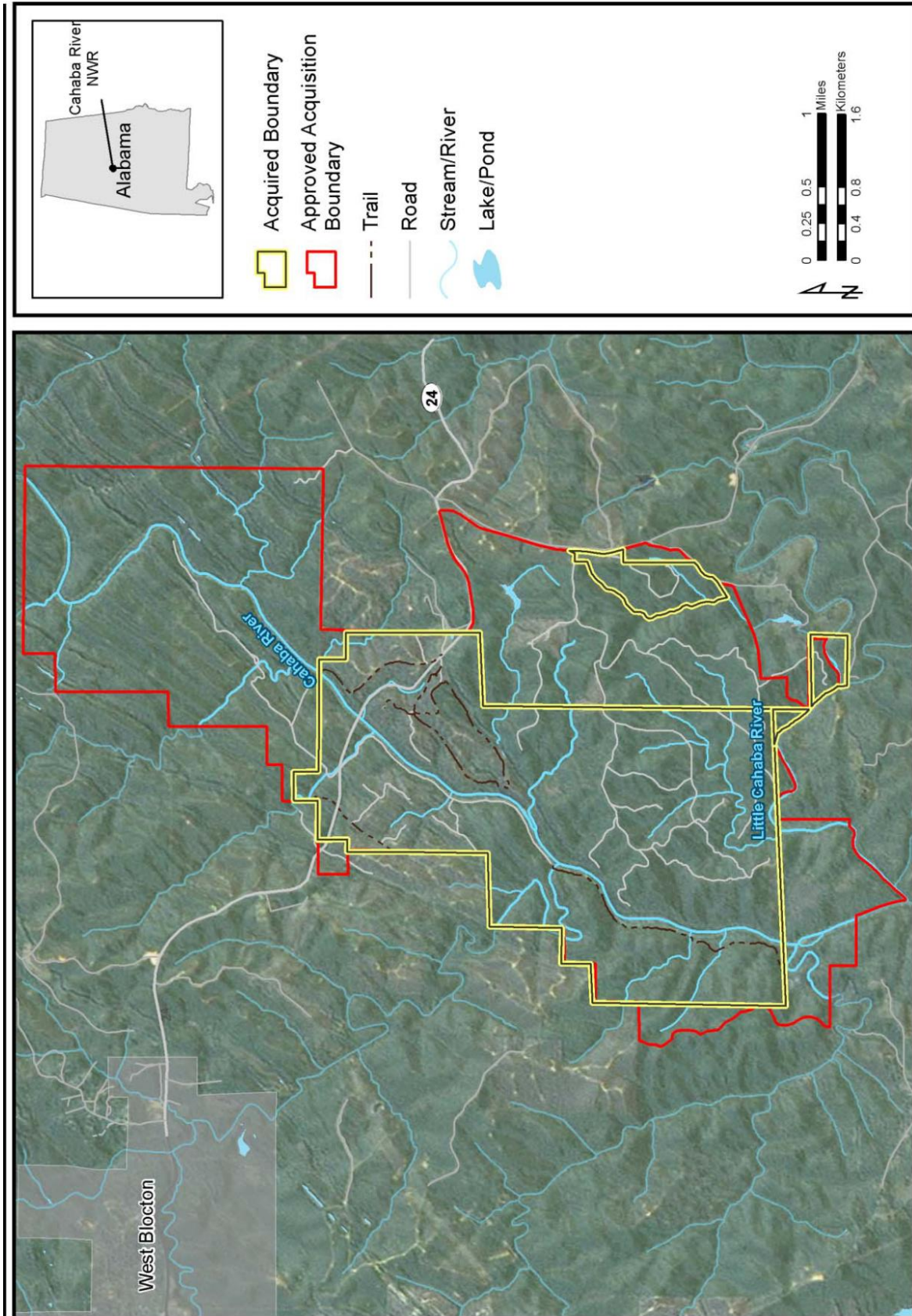
#### SPECIAL DESIGNATIONS

##### *CRITICAL HABITAT*

Critical habitat is an area identified as essential for the conservation of a federally listed species. This designation only affects the use of areas where federal funding and/or permitting is involved, and it requires that federal agencies make special efforts to protect the important characteristics of these areas.

As part of a series of designations in the Mobile River Basin, the entire length of the Cahaba River was designated in 2004 as critical habitat for 2 federally listed freshwater fish species (42 FR 60765-60768; [http://ecos.fws.gov/docs/federal\\_register/fr170.pdf](http://ecos.fws.gov/docs/federal_register/fr170.pdf)). The refuge lies in what was termed "Critical Unit 13" which encompasses 77 miles of river channel, including 65 miles of the Cahaba River, extending from U.S. Highway 82, Centerville, Bibb County, upstream to Jefferson County Road 143, Jefferson County. In addition, 12 miles of Little Cahaba River were included in the designation.

Figure 2. Cahaba River NWR, Bibb County, Alabama



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## *SIGNIFICANT LANDSCAPE FOR LONGLEAF PINE RESTORATION AND MANAGEMENT*

The refuge and surrounding areas have been designated as a “Significant Landscape” for longleaf pine conservation and management. Significant landscapes for longleaf conservation are regions where there is the potential to restore connected landscapes of more than 100,000 acres of longleaf pine communities.

### **ECOSYSTEM CONTEXT**

Although described as Alabama’s longest free-flowing river, the Cahaba River technically contains the longest stretch of free-flowing river in Alabama, an approximately 150-mile stretch of free-flowing water from the Highway 280 diversion dam to the river’s confluence with the Alabama River. The overall river watershed consists of 1,824 square miles. Free-flowing streams and rivers are considered an endangered habitat type due to damming for hydroelectric production, transportation, and flood control (Noss et al. 1995). This 190-mile-long river extends from its source near Trussville in St. Clair County south to the Alabama River. The Cahaba River and its major tributaries support one of the most diverse aquatic ecosystems in North America (Pierson et al. 1989). The prominence of shoals along the upper river reaches and lack of significant development immediately adjacent to the river, along much of its length, further enhance the river’s species richness.

The Cahaba River and its major tributaries are located both above and below what is commonly referred to as the “fall line.” The fall line separates the Valley and Ridge Physiographic Province from the Coastal Plain Physiographic Province (Figure 3). Rivers and streams are strikingly different in function and appearance depending upon their location above or below the fall line. The fast moving rivers and streams that flow over rocky shoals above the fall line are replaced by a slower moving river and streams over a sand/silt bottom with a larger floodplain below the fall line.

### *CAHABA RIVER BASIN*

The Cahaba River Basin lies entirely within the State of Alabama, and encompasses approximately 1,824 square miles including portions of St. Clair, Jefferson, Shelby, Bibb, Tuscaloosa, Perry, Chilton, and Dallas counties (Figure 4). Elevation in the watershed ranges from 1,100 feet in Shelby County to 100 feet at the confluence with the Alabama River. The Cahaba River is the third largest tributary to the Alabama River in the Mobile River basin and extends for 191 miles from its headwaters in St. Clair County northeast of Birmingham to its confluence with the Alabama River southwest of Selma. It is a major municipal water supply for the Birmingham metropolitan area, and is also used for the disposal of domestic and industrial wastewater. The Cahaba River is used for recreation by canoeists and anglers.



**Figure 3. Physiographic regions**



U.S. Fish & Wildlife Service

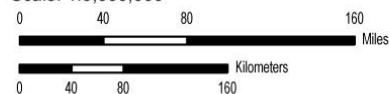
**Cahaba River National Wildlife Refuge**  
Bibb County, Alabama

*Partners in Flight Physiographic Regions*



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Scale: 1:5,000,000



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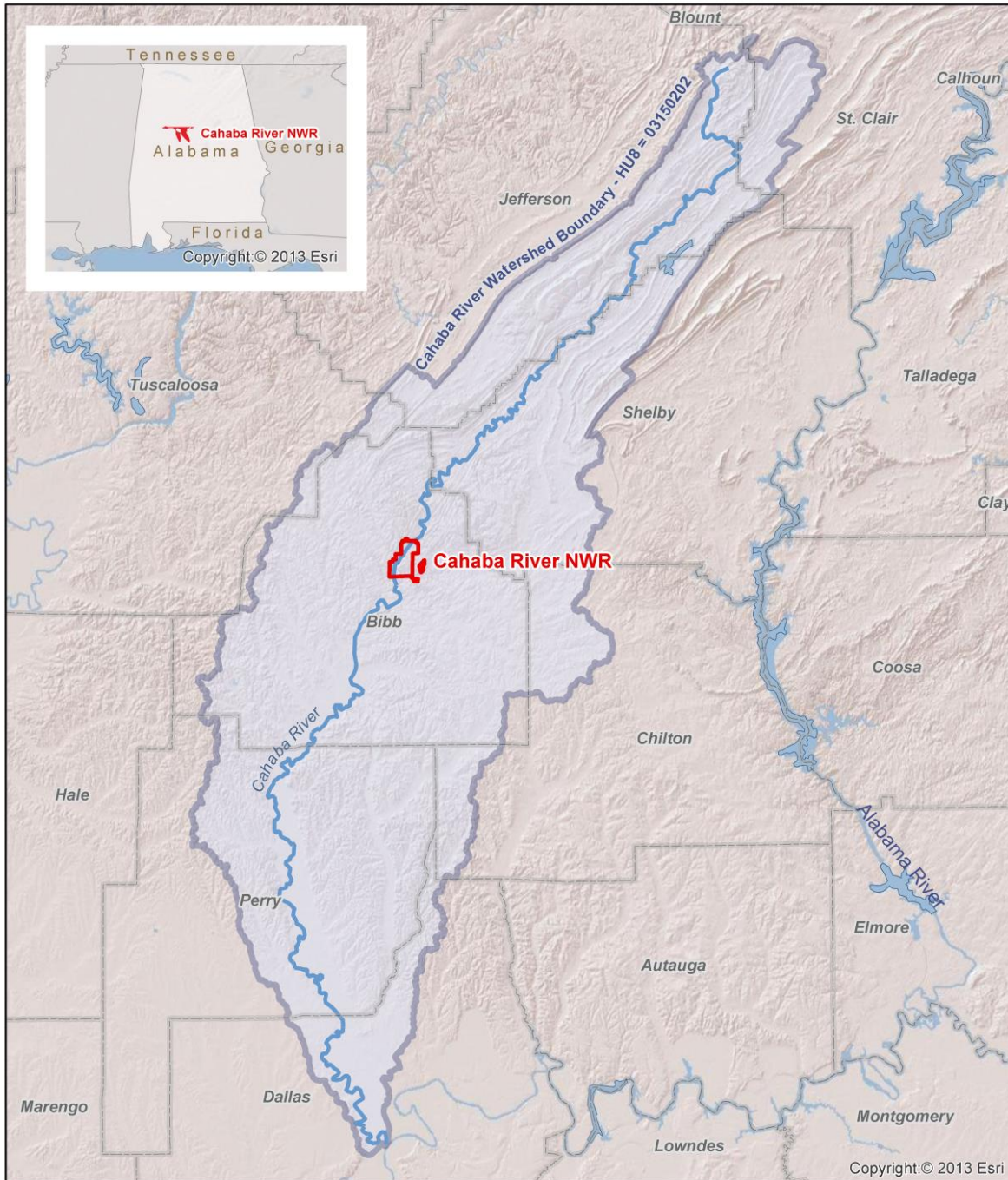


**Figure 4. Cahaba River basin**

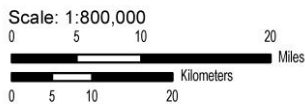


U.S. Fish & Wildlife Service  
**Cahaba River National Wildlife Refuge**  
 Bibb County, Alabama

*Cahaba River Watershed*



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 Current to October 2013  
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## ECOLOGICAL THREATS AND PROBLEMS

### *ALTERATIONS TO HYDROLOGY AND DEGRADATION OF AQUATIC ECOSYSTEMS*

Southeastern states have the greatest numbers of imperiled and vulnerable freshwater fish species in the country. They are at increased risk from changes in hydrology (water flow) and water quality.

Increasing human populations and associated residential and commercial development often cause hydrologic changes. Development results in the expansion of paved impervious surfaces (e.g., roads, parking lots). These landscape alterations tend to generate pulses of water, particularly during high rainfall events. As water velocities and flood frequencies increase, the streams become incised and start a long-term pattern of bank erosion, sediment mobilization and readjustment, all of which also has a detrimental impact on stream biota for many miles downstream. Sedimentation in streams, as a result of development, is not only caused by sediment-laden run-off from construction sites, but most of the mobilized sediment in streams is a direct result of an increase in water velocity that destabilizes the stream channel. In addition, first and second order streams are straightened, realigned and frequently deepened, commonly referred to as channelization which reduces pool-riffle sequences typically found in streams. The loss of these microhabitats decreases the diversity of aquatic organisms that the stream can support. Furthermore, aquatic vegetation is less likely to be supported in deeper streams, and the loss of this source of cover further decreases the number and density of species found in the stream.

Water quantity refers to the amount of water available for use by humans or habitats/wildlife. In streams and rivers, water quantity is governed by precipitation, groundwater sources, evaporation, and human use. As areas along waterways are converted to cities, industrial areas, farms, and mines, water quantities available to aquatic organisms may be reduced. This becomes particularly critical during prolonged droughts, where water consumption for human needs may cause small streams to run dry, completely eliminating local populations of fish, snails, and mussels.

Water quality consists of the physical, chemical, and biological characteristics of water and is an important factor in determining what types of aquatic organisms can be supported by a stream or river. Potential sources of water pollution in the Cahaba River watershed include sedimentation, excessive nutrients, pesticides, and hydrocarbons (oil-derivatives). Rapid urbanization and commercial development in the area south and southeast of Birmingham (Jefferson, Shelby and St. Clair counties) are the primary forces shaping water quality conditions and biological communities both directly in the upper Cahaba River drainage and indirectly in the lower Cahaba River drainage through material and pollutant transport (Cahaba River Basin Clean Water Partnership (CRBCWP) 2003). Typically, water pollutions tend to increase as land adjacent to a waterway is urbanized, mined, farmed, and used for commercial timber operations.

Development increases the likelihood that surface runoff from roads, parking lots and lawns will introduce contaminants such as pesticides, oils and grease residues from cars, fertilizers, and cleaning products. The loss of vegetative cover in developed areas also causes localized warming as vegetated areas that provide shade are cleared. The resulting increases in water temperatures can be detrimental to some aquatic organisms that are adapted to lower water temperatures.

Pollution associated with mining includes acid rock drainage, heavy metals, processing chemicals, and sedimentation. Acid rock drainage is a natural process whereby sulfuric acid is produced when sulfides in rocks are exposed to air and water. Acid is carried off the mine site by rainwater or surface drainage and deposited into nearby streams, rivers, lakes, and groundwater, where it severely degrades water quality, and can kill aquatic life and make water virtually unusable. Heavy metal



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pollution is caused when such metals as arsenic, cobalt, copper, cadmium, lead, silver, and zinc contained in excavated rock or exposed in an underground mine come in contact with water. Metals are leached out and carried downstream as water washes over the rock surface. Chemicals used in mining processes include cyanide or sulfuric acid which may be used to separate the target mineral from the ore. These highly toxic chemicals spill, leak, or leach from the mine site into nearby water bodies. Erosion and sedimentation may also result from mining. Mineral development disturbs soil and rock in the course of constructing and maintaining roads, open pits, and waste impoundments. In the absence of adequate prevention and control strategies, erosion of the exposed earth may carry substantial amounts of sediment into streams, rivers, and lakes. Excessive sediment can clog riverbeds and smother watershed vegetation, wildlife habitat, and aquatic organisms.

Agricultural operations can cause increased sedimentation rates in local waterways, as bare soils are exposed to wind and water. In addition, pesticides used to control harmful insects and weeds can make their way into adjacent waters. Farming often includes the use of fertilizers. These can enter nearby waters, resulting in algal blooms and dense stands of certain water plants, crowding out beneficial species or reducing habitat for mussels.

Commercial timber operations that occur in the watershed can cause declines in water quality as well. Clear-cut areas can become sources of sediment, as rains wash exposed soils downstream. In addition, commercial forestry may include the use of pesticides and fertilizers, which can be washed into area waterways.

#### *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 (U.S. Fish and Wildlife Service 1998). 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. Current and projected human population levels are expected to continue to increase in the vicinity of the refuge and are further detailed in the Socioeconomic section.

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## *PROLIFERATION OF NONNATIVE AND INVASIVE SPECIES*

Nonnative (introduced) species have the potential to negatively influence native species through habitat alteration, resource competition, predation, or any combination of these factors. All major habitats on the refuge have nonnative species. Nonnative plants compete with native plant species and can cause dense stands that have less wildlife value than what is provided by native trees and shrubs. Nonnative wildlife includes feral hogs, which can damage habitat and cause erosion. Introduced aquatic species include Asian clam, which may compete for space and food with native mussels. Several nonnative species of concern are further detailed under the Biological Resources section below.

## *CLIMATE CHANGE*

The Intergovernmental Panel on Climate Change (IPCC) has concluded that warming of the climate is undeniable and could cause changes in our stewardship of land (IPCC 2007). Climate change is already affecting natural systems through changes in temperature and precipitation patterns. These in turn alter the distribution of natural communities, wildlife migrations, spread of exotic species, and water availability, among others. Based on these findings and other similar studies, the Department of the Interior requires agencies under its direction to consider potential climate change effects as part of their long-range planning activities (USFWS 2010). Of particular concern is the threat of shifting ecosystems to areas that are currently unprotected. Many conservation areas were established to protect certain rare species and habitats, and these sites are likely to become unsuitable in the future. Newly protected areas would be needed, often north of the original sites, but in many locations agricultural or urban lands preclude that option. On current conservation lands, species moving in from the south could also become part of the protected fauna, requiring additional management efforts.

## **PHYSICAL RESOURCES**

### *CLIMATE*

The climate of central Alabama is humid and temperate, with monthly temperatures ranging from average lows of 32°F in January to average highs of 90° F during July and August (Table 1), National Oceanographic and Atmospheric Administration/NOAA 2011a). 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.

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.



**Table 1. Climatology for Birmingham, Alabama, for the period 1971-2000 (NOAA 2011a)**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
<b>Averages</b>													
<b>Average Low Temperature (F)</b>	32.3	35.4	42.4	48.4	57.6	65.4	69.7	68.9	63	50.9	41.8	35.2	50.90
<b>Average High Temperature (F)</b>	52.9	58.3	66.5	74.1	81	87.5	90.6	90.2	84.6	74.9	64.5	56	73.40
<b>Average Precipitation (Inches)</b>	5.45	4.21	6.1	4.67	4.83	3.78	5.09	3.48	4.05	3.23	4.63	4.47	<b>53.99 (total)</b>
<b>Records</b>													
<b>Lowest Temperatures (F)</b>	-6	4	2	26	36	44	54	52	39	28	15	1	
<b>Highest Temperatures (F)</b>	77	83	89	92	96	100	106	103	100	91	85	79	
<b>Highest Rainfall (inches)</b>	9.6	9.3	15.8	13.8	9.6	9.0	10.1	9.0	10.4	11.9	9.7	12.6	81.80 (1929)

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Rainfall is approximately 54 inches per year, and there is seldom extended accumulations of snow or ice. 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, and 2007 was among the driest years on record, with the annual precipitation only being about half the normal yearly total.

Severe weather is usually in the form of thunderstorm and associated tornadoes. Tornadoes can occur during any time of the year, but are more common during the spring and fall. The April 2011 tornado outbreak was among the most severe since record-taking began. During that outbreak, at least one tornado touched down in Bibb County for almost three miles (NOAA 2011b). Tropical systems occasionally impact the area, bringing high winds and heavy rain.

### *CLIMATE CHANGE*

Secretarial Order 3226 (Amendment 1) requires that climate change impacts be considered and analyzed when planning or making decisions within the Department of the Interior (U.S. Secretary of the Interior 2009). This order serves as an opportunity for the Service to incorporate climate change impacts into its conservation planning activities. Additionally, this proposal would contribute to the climate adaptation goals and objectives laid out in the Service's Strategic Plan for Responding to Accelerated Climate Change, "Rising to the Urgent Challenge" (USFWS 2010).

Greenhouse gases absorb radiative energy from the sun, a process which has maintained temperatures on Earth within the tolerance limits for life to exist. However, human land use changes, energy use, and other activities contribute greenhouse gases to the atmosphere, with the potential to alter the global climate. "Warming of the earth's climate is unequivocal, as is now evident from observations of increases in average global air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level," according to the Intergovernmental Panel on Climate Change (IPCC) Report (Intergovernmental Panel on Climate Change 2007). The IPCC Report (2007) describes changes in natural ecosystems with potential wide-spread effects on many organisms, including fish and migratory birds and their habitats.

Scientific evidence that has emerged since the publication of the IPCC Report (2007) indicates an acceleration in global climate change (The Copenhagen Diagnosis 2009). Important aspects of climate change seem to have previously been underestimated and the resulting impacts are being felt sooner. For example, early signs of change suggest that the 1°C of global warming the world has experienced to date may have already triggered the first tipping point of the Earth's climate system – the disappearance of summer Arctic sea ice. Both 2007 and 2011 had the lowest Arctic sea ice cover on record, and the annual rate of decline is approximately 1 percent (National Snow and Ice Data Center 2012). Since snow and ice reflect more heat back into space compared to open water, and once the Arctic Ocean becomes completely ice-free in summer, substantial additional warming may take place. This process could lead to rapid and abrupt climate change, rather than the gradual changes that were originally forecasted.

The refuge lies in a region that has seen a decline in precipitation over the years. Although the U.S. annual average precipitation has increased by about 7 percent over the past 30 years, there has been pronounced drying over the southeast and southwest. Trends in precipitation from 1901 to 2006 show that rainfall in parts of the southeast substantially declined since the 1900s (Backlund et al. 2008). At the same time, the U.S. Global Change Research Program reports that extreme precipitation events are on the rise (Kunkel et al. 2008). Data collected between 1958 and 2008

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show that even in drier regions, heavy precipitation events have increased, with the amount of precipitation falling in the heaviest 1 percent of rain events increasing nearly 20 percent during the past 30 years. Meanwhile, there has been little change or a decrease in the frequency of light and moderate precipitation during that timeframe (Kunkel et al. 2008). The result is that some area will be more prone to flooding rains, followed by longer periods of drought. Warmer temperatures will only serve to compound these trends, as warmer air can hold more moisture, increasing the likelihood of heavy downpours. In between these extreme rainfall events, drought-like conditions will likely increase in frequency, as increasing temperatures will accelerate soil-moisture evaporation rates, reducing the amount of water available to plants. It is expected that water needed to recharge groundwater and surface waters will also diminish.

How natural systems will react to climate change is currently not well understood. This is because a warming atmosphere will not only change local temperatures, but it will also affect precipitation patterns, as discussed below. Figures 5 and 6 show the projected changes in temperature and precipitation for Alabama over the next 40 years, respectively (The Nature Conservancy, University of Washington, and University of Southern Mississippi 2012).

#### *HYDROLOGY AND WATER QUANTITY*

The refuge is located within the 1,824-square-mile Cahaba River watershed, approximately 15 miles north of the Fall Line. About three miles of the Cahaba River flows through the center of the refuge, additionally tributary streams on the refuge include Little Ugly and Caffee creeks. Portions of the Little Cahaba River flow through and along the southern refuge boundary. Big Ugly Creek is just north of the refuge, while Pratt Creek is near the southern refuge boundary.

Cahaba River NWR is located within the Cahaba (Hydrologic Unit Code (HUC) 03150202) sub-basin of the Alabama River basin (HUC 031502), which consists of adjacent drainages lying within both the Valley and Ridge and East Gulf Coastal Plain physiographic provinces. The Cahaba River is the third largest tributary to the Alabama River in the Mobile Bay - Tombigbee basin (HUC 031602).

The Cahaba River originates from springs and seeps on the southern slope of Cahaba Mountain in St. Clair County, and from springs and seeps along the edge of Red Mountain in Jefferson County, northeast of Birmingham (Benke and Cushing 2005).

Elevation in the watershed ranges from 1,100 feet in Shelby County to 100 feet at the confluence with the Alabama River (CRBCWP 2003). From its headwaters to the Fall Line the river descends approximately 200 m at a rate of 1.3 m/km. Stream channels in the headwaters are narrow and bedrock-boulder dominated and followed a rectangular drainage pattern as a result of faulting. Downstream of the headwaters, the river width increases and large shoals develop, but high sandstone bluffs constrain the channel and allow limited floodplain development. Farther downstream carbonate outcrops are present where the river has eroded through the younger, overlying Pottsville sandstone. As the river passes over the Fall Line into the Coastal Plain its average gradient declines to approximately 0.2 m/km, the bluffs diminish, the channel widens, and discharge increases as the river flows over unconsolidated alluvial sediments. The lower Cahaba River includes oxbow lakes, Black Belt chalk, and prairie cliffs. The channel of the lower Cahaba River is wide (50 m or 164 ft) and deep (4 to 6 m or 13 to 20 ft) with shear banks. The upper basin is primarily precipitation fed, while the lower basin in the Coastal Plain receives substantial contributions of groundwater (Benke and Cushing 2005).

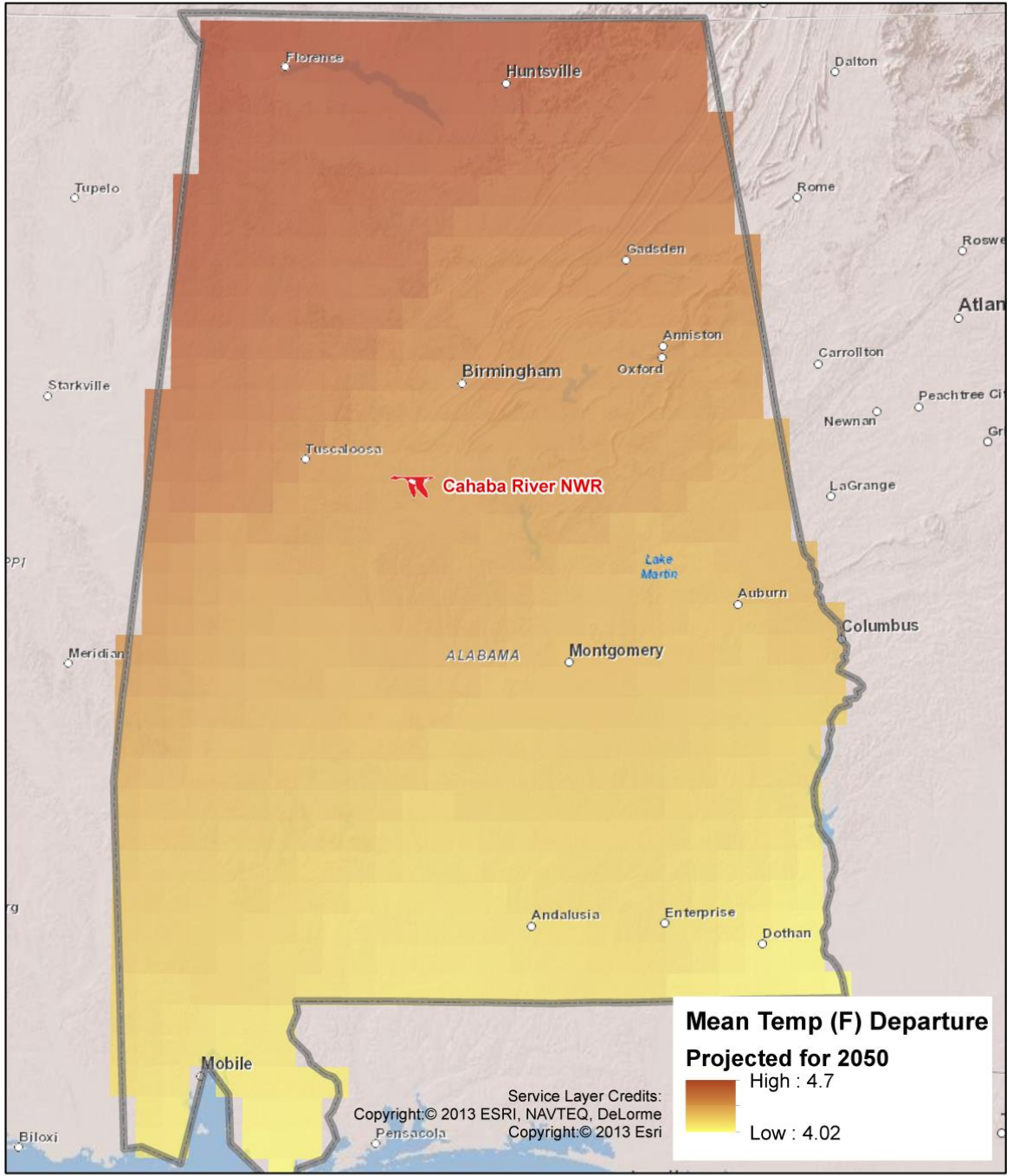
**Figure 5. Projected change in average annual temperature across Alabama by 2050**



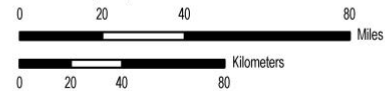
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**Cahaba River National Wildlife Refuge**  
Bibb County, Alabama

*Change in Annual Temperature by the 2050s*



Scale: 1:2,500,000



Produced for the Division of Planning  
Current to: October 2013  
Basemap: ArcGIS Online 2013  
Climate data: Maurer, E. P., L. Brekke, T. Pruitt, and P. B. Duffy (2007). Fine-resolution climate projections enhance regional climate change impact studies. *Eos Trans. AGU*, 88(47), 504  
Accessed 12/21/11 via www.climatewizard.org

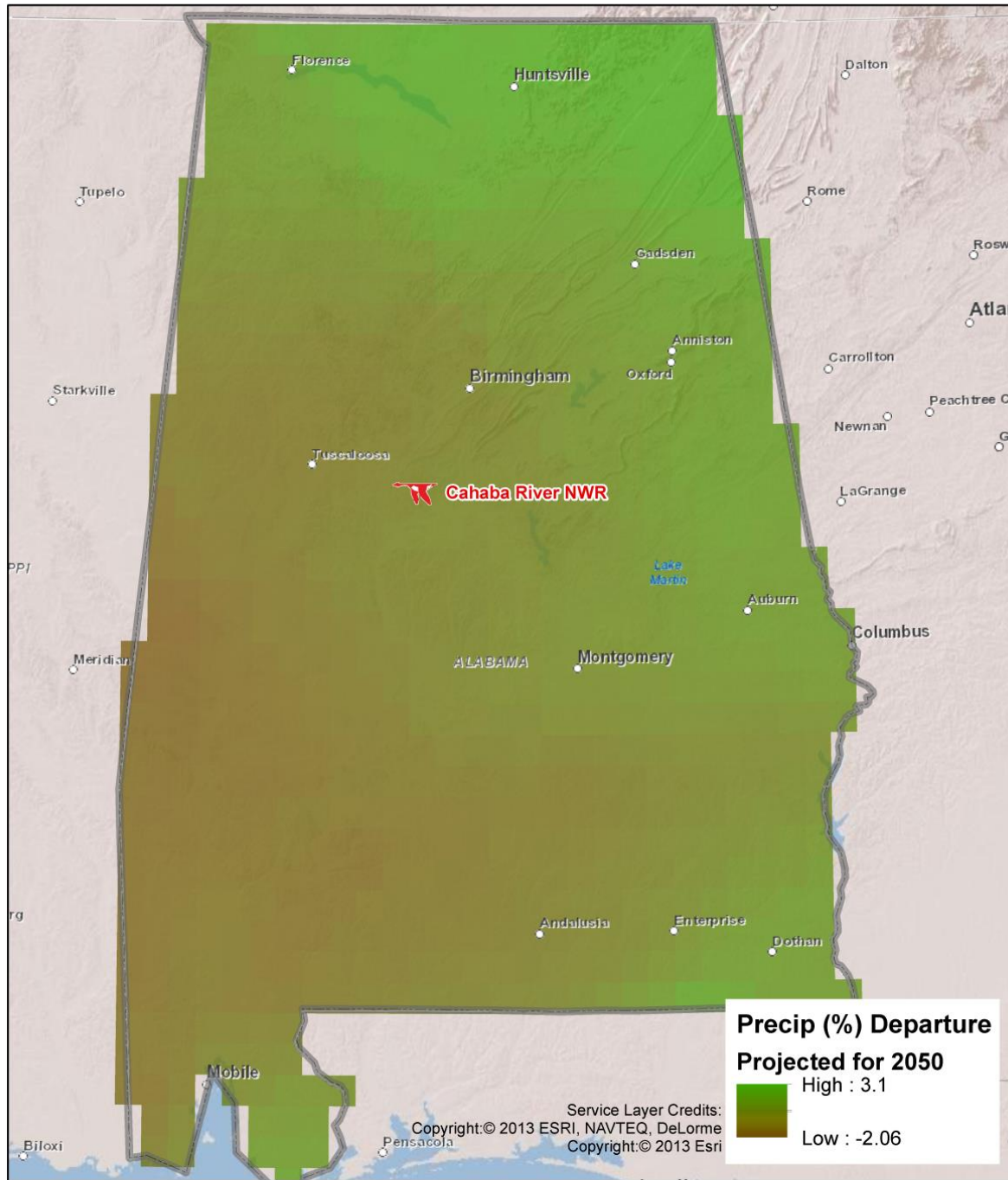


**Figure 6. Projected change in average annual precipitation across Alabama by 2050**



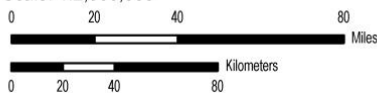
U.S. Fish & Wildlife Service  
**Cahaba River National Wildlife Refuge**  
 Bibb County, Alabama

*Change in Annual Precipitation by the 2050s*



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 Current to: October 2013  
 Basemap: ArcGIS Online 2013  
 Climate data: Maurer, E. P., L. Brekke, T. Pruitt, and P. B. Duffy  
 (2007), Fine-resolution climate projections enhance regional climate  
 change impact studies. *Eos Trans. AGU*, 88(47), 504  
 Accessed 12/21/11 via www.climatewizard.org

Scale: 1:2,500,000



The U.S. Geological Survey (USGS) and its partners operate several water data collection stations along the Cahaba River. Parameters collected at these stations include stream-flow (discharge), gage height, temperature, dissolved oxygen, and conductance. Three of the nearest stations upstream of the refuge are in the vicinity of Acton, Helena, and Hoover. Of these, the station near Acton has the longest data record. Starting in 1938, river discharge (flow rate) data has been collected in the vicinity of the Acton (Jefferson County), which has been summarized in Table 2, (USGS 2011). Since record keeping began, the annual average discharge rate at this site has been approximately 351 cubic feet per second (cfs). Mean monthly discharge rates range from 98 to 765 cfs. Minimum flows tend to be during the months of August through September, while maximum flow rates are generally recorded January through March. During the drought of 2007, the Acton segment of the Cahaba River had the lowest average flow rate (104 cfs) since 1939. Discharge rates dropped to 52 cfs in April and remained in the double digits throughout the year. Other years with low average flow rates include 1985, 1986, and 1988. Periods of past low flow rates also include the summers of 1954 through 1956, during which the discharge rates were almost zero for some months. Conversely, years of exceptionally high water include 1946, 1948, 2003, 2004, and 2009 (USGS 2011).

**Table 2. Monthly Cahaba River discharge data for 1939 – 2009**

<b>Month</b>	<b>Mean Discharge Rate (cfs)</b>	<b>Minimum Discharge Rate (cfs)</b>	<b>Maximum Discharge Rate (cfs)</b>
<b>January</b>	619	27	1,717
<b>February</b>	750	116	1,974
<b>March</b>	765	66	1,652
<b>April</b>	494	11	1,479
<b>May</b>	274	20	2,717
<b>June</b>	171	5	1,197
<b>July</b>	184	7	1,236
<b>August</b>	117	1	812
<b>September</b>	143	<1	946
<b>October</b>	98	<1	848
<b>November</b>	246	3	1,880
<b>December</b>	357	26	1,575

*cfs-cubic feet per second*  
*Source: USGS 2011*

## **GEOLOGY AND TOPOGRAPHY**

The coal beds of the Cahaba coal field are contained within the Pottsville Formation of lower Pennsylvanian age (QORE, Inc. 2004). The Pottsville Formation is reported to be locally more than 8,000 feet thick and divided into three large scale assemblages known as magnafacies. Each

magnafacies is described as a measure, a term which describes a characteristic series of beds consistent throughout an area. These magnafacies are described as the Quartzarenite Measures (Oldest, bottom), the Mudstone Measures (middle), and the Conglomerate Measures (youngest, top). Coal mining on the refuge took place within the Conglomerate Measures. The Conglomerate Measures comprise the upper 2,500 feet of the Pottsville Formation. These measures contain abundant lithoclasts (contained rock pieces within conglomerate beds) of chert, granite, basalt, gneiss, schist, and volcanics. Coal mining on the northern part of the refuge occurred in the Thompson Coal Bed. Specifically, Thompson coal lies atop the Straven Conglomerate, a significant and widespread marker bed within the lower portion of the Conglomerate Measures. Typically, Thompson coal is 2 to 3 feet thick, but has been reported up to 5 feet thick.

The refuge is characterized by rolling hills with steep ravines along the river and tributary streams. The topography ranges from 220 feet (asl) along the river to 560 feet (asl) on some hilltops. The topography has been altered due to historic strip-mining on northern portions of the refuge.

### SOILS

The major soil types within the refuge acquisition boundary are listed in Table 3. Sipsey-Nauvoo Complex soils make up the majority of the soils. See Tables 4 and 5 for a list of soil types and soil units of refuge lands. See Figure 7 for a distribution of soils across the refuge.

**Table 3. Soils types within Cahaba River NWR acquisition boundary**

Soil Series	Acres within Acquisition Boundary
Bibb-luka complex, 0 to 1 percent slopes, frequently flooded	5.1
Bodine very gravelly silt loam, 6 to 15 percent slopes, stony	192.1
Bodine-Minvale complex, 15 to 35 percent slopes, stony	98.4
Bodine-Minvale complex, 35 to 50 percent slopes, stony	10.9
Cahaba sandy loam, 2 to 5 percent slopes, rarely flooded	16.9
Gorgas-Rock outcrop complex, 35 to 60 percent slopes	713.8
Mantachie, luka, and Kinston soils, 0 to 1 percent slopes, frequently flooded	4.0
Minvale gravelly silt loam, 2 to 6 percent slopes	1.7
Nauvoo sandy loam 2 to 8 percent slopes	661.8
Palmerdale and Brilliant soils, 6 to 45 percent slopes	383.6
Sipsey-Nauvoo-Sunlight complex, 15 to 35 percent slopes	3009.0
Sipsey-Nauvoo-Townley complex, 6 to 15 percent slopes	2252.6
Smithdale sandy loam, 2 to 8 percent slopes	50.2
Talbott silt loam, 6 to 15 percent slopes, boulder	0.4
Water	266.9
<b>Total</b>	<b>7667.4</b>

[Source: SSURGO undated.]

**Table 4. Descriptions of soil map units within Cahaba River NWR acquisition boundary**

Map Unit	Description
<b>Nauvoo-Sipsey-Townley-Sunlight</b>	Dominantly gently sloping to very steep, well-drained and somewhat excessively well-drained soils that have a loamy surface layer and a loamy or clayey subsoil; formed in materials weathered from sandstone and shale.
<b>Gorgas-Rock outcrop</b>	Shallow, dominantly steep to very steep, well-drained soils with a loamy sand surface layer, sandy loam subsurface layer, and sandy loam subsoil; derived from sandstone
<b>Palmerdale and Brilliant</b>	Deep, dominantly gently sloping to very steep, somewhat excessively drained soils with a very to extremely channery silt loam surface layer and substratum; located on summits, shoulders, and backslopes.
<b>Bodine-Minvale-Fullerton</b>	Very deep, moderately steep to very steep, well-drained and somewhat excessively drained soils that have a loamy or clayey subsoil; formed in residuum derived from limestone and cherty limestone.
<b>Smithdale</b>	Very deep, well-drained gently sloping to moderately steep soils with sandy loam to sandy clay loam surface layer and subsoil; located on ridges and hillslopes.
<b>Cahaba</b>	Dominantly level to gently sloping, well-drained soils that have a sandy loam to fine sandy loam surface layer and a sandy loam or sandy clay loam subsoil; located on low stream terraces.
<b>Bibb-luka complex</b>	Dominantly level, poorly drained to moderately well-drained soils with sandy loam surface and subsurface layers; located along floodplains.
<b>Mantachie-luka-Kinston</b>	Dominantly level, somewhat poorly drained, moderately well-drained and poorly drained soils that have a loamy surface layer and subsoil or have a loamy or sandy substratum; located on lower parts of floodplains.
<b>Talbott</b>	Moderately deep, dominantly gently to moderately sloping, well-drained soils with a silt loam to silty clay loam surface layer and silty clay to clay subsoil; derived from limestone.

[Source: SSURGO undated].



**Table 5. Water quality summary (1970 – 1990) for the Upper Cahaba River**

<b>Water Quality Parameter</b>	<b>Mean</b>	<b>Minimum</b>	<b>Maximum</b>
<b>BODs (mg/l)</b>	1.4	ND	12.4
<b>Total Dissolved Solids (mg/l)</b>	108	8	212
<b>Total Suspended Solids (mg/l)</b>	7.9	ND	96
<b>Fecal Coliform Bacteria (#/100 ml)</b>	234	ND	19,400
<b>Nitrate Nitrogen (mg/l)</b>	1.1	0.07	9.8
<b>Ammonia Nitrogen (mg/l)</b>	0.56	ND	16
<b>Phosphates (mg/l)</b>	0.27	ND	16
<b>Arsenic (ug/l)</b>	<5	ND	60
<b>Cadmium (ug/l)</b>	<10	ND	70
<b>Chromium (ug/l)</b>	<7.5	ND	138
<b>Copper (ug/l)</b>	<0.8	ND	530
<b>Iron (ug/l)</b>	0.29	ND	7.9
<b>Lead (ug/l)</b>	25	ND	90
<b>Mercury (ug/l)</b>	0.32	ND	15
<b>Zinc (ug/l)</b>	27	ND	870

*BOD – biochemical oxygen demand*

*ND – not detected*

*Source: Pitt 2000*

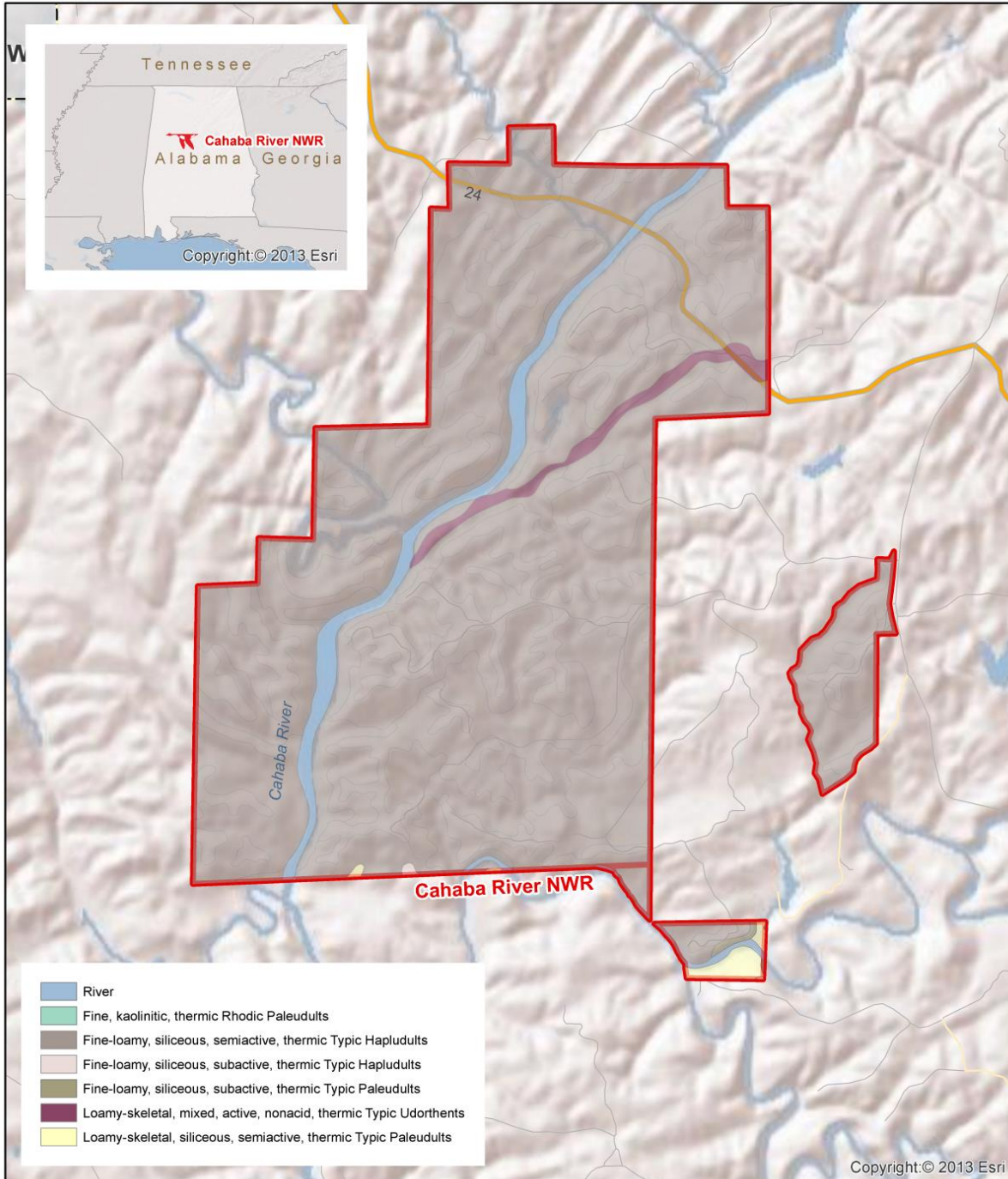
**Figure 7. Soils of Cahaba River NWR**



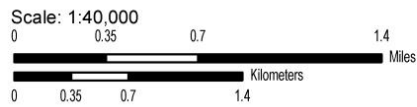
U.S. Fish & Wildlife Service

**Cahaba River National Wildlife Refuge**  
Bibb County, Alabama

*Soils*



Produced for the Division of Planning  
Current to October 2013  
Basemap: ArcGIS Online 2013



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## AIR QUALITY

The Clean Air Act of 1970 (as amended in 1990 and 1997), required the U.S. Environmental Protection Agency (EPA) to implement air quality standards to protect public health and welfare. National Ambient Air Quality Standards (NAAQS) were established based on protecting health (primary standards) and preventing environmental and property damage (secondary standards) (EPA 2013). Criteria air pollutants in Alabama include carbon monoxide (CO), lead, nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), particulate pollution (PM: PM<sub>2.5</sub> and PM<sub>10</sub> ug/m<sup>3</sup>), and sulfur dioxide (SO<sub>2</sub>). Primary sources of air pollutants are vehicle emissions, power plants, and industrial activities. These pollutants are monitored by a network of monitoring stations throughout the state and analyzed in order to better understand general air quality trends and to locate exceedances. The nearest air quality monitoring stations to the refuge are located in Birmingham, Alabama. Lead is currently not being monitored by the Birmingham network. Generally, air quality in refuge and vicinity likely exceeds that of Birmingham, given the lower number of emitters (traffic, industry). However, even in this sparsely populated region, certain pollutants may occasionally approach or reach nonattainment levels due to stagnant weather conditions, wildfires, etc.

## WATER QUALITY

Water quality of the Cahaba River remains relatively good, with waters along its entire length attaining all applicable water quality standards (ADEM 2012). ADEM recognizes three sections of the river as Outstanding Alabama Waters: from the Alabama River upstream to Shelby County Road 52, from the dam near U.S. Highway 280 to Grant's Mill Road, and from U.S. Highway 11 upstream to the source of the Cahaba River (ADEM 2012). However, water quality along certain sections of the river is not optimal. A comprehensive report analyzing water quality data from the 1970s through 2000 found that heavy metals, nutrients, sediment, and oxygen-demanding materials were of concern, with most of the pollution sources coming from non-point sources (Pitt 2000). Table 5 summarizes selected water quality parameters during the 20-year timeframe.

More recent water quality data has been collected by Alabama Water Watch (AWW). AWW is a citizen volunteer, water quality monitoring program covering all of the major river basins in Alabama. The organization's operational headquarters are located at Auburn University. Between June 2011 and January 2012, several water quality parameters were collected at a location several miles north of the refuge. Of these, dissolved oxygen was between 6.0 and 8.6 ppm and turbidity ranged between 5 and 15 JTUs (AWW 2012).

## Biological Integrity Monitoring

Biological water quality monitoring involves collecting samples of aquatic invertebrates. Aquatic invertebrates live in water for at least part of their life cycle. They include insects, worms, snails, mussels, leeches, and crayfish. For the purpose of assessing water quality, sampling is focused on benthic invertebrates, those organisms that live at the stream bottom. Monitoring invertebrate life in a stream is one way to measure water quality, because some of these organisms are highly sensitive to pollution, while others tolerate it. Hence, the composition of the benthic invertebrates community or the biological integrity of a stream or river provides a suitable measure of water quality (Plafkin et al. 1989). ADEM has been conducting biological monitoring of aquatic invertebrate communities in the Cahaba River basin since 1974. Biological integrity data collected between 1974 and 1992 showed a slight improvement in overall water quality at a station just south of Harrisburg (ADEM 1994).

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## NOISE

Noise pollution is currently not an issue at the refuge. The refuge lies in a rural area with few major roads, industrial areas, or airports that could be potential sources of noise.

## BIOLOGICAL RESOURCES

### HABITAT

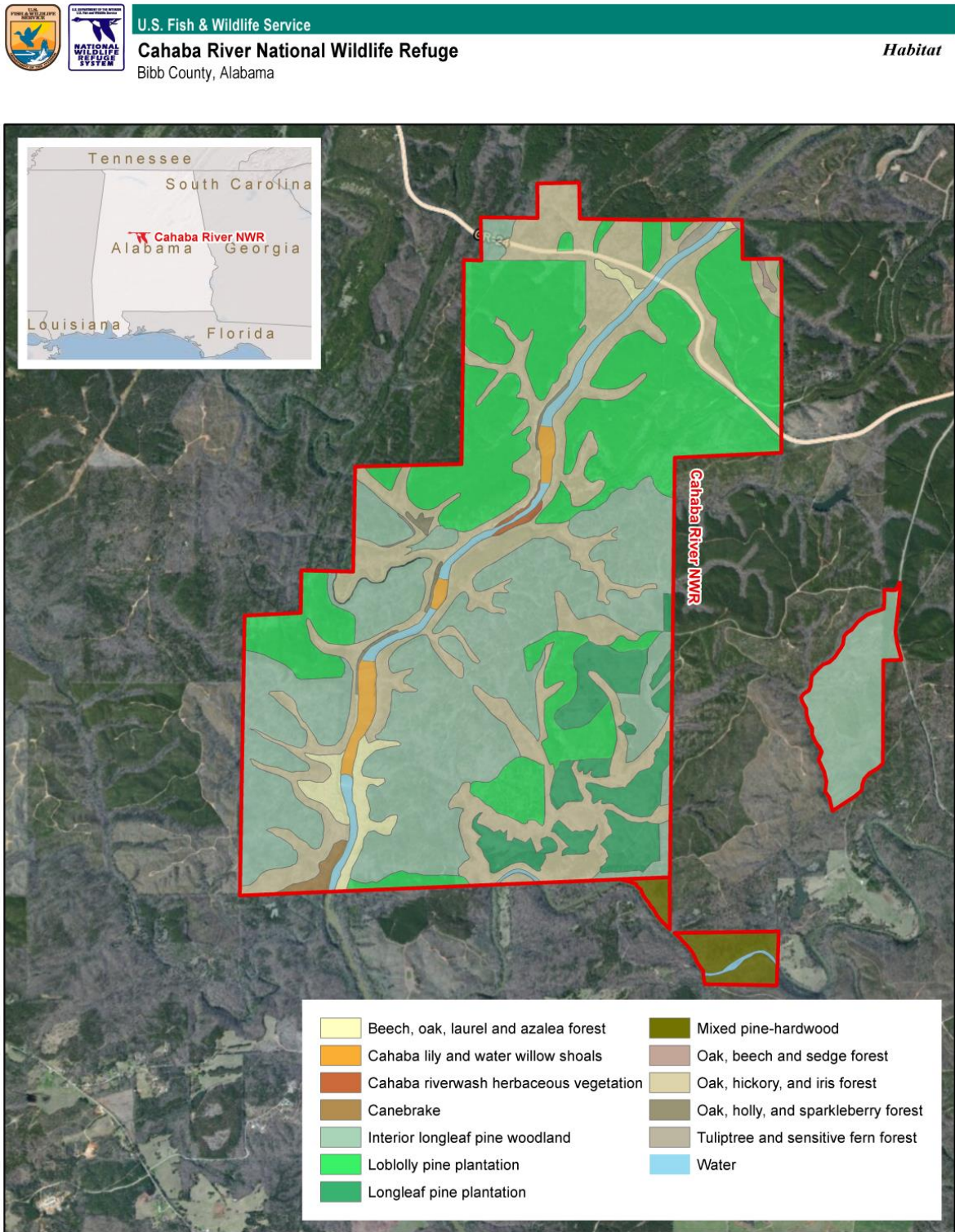
Natural communities are assemblages of species that occur together in space and time. These groups of plants and animals are found in recurring patterns that can be classified and described by their dominant physical and biological features. For the purposes of this Draft CCP/EA, natural communities will be used synonymously with habitats. The location and configuration of refuge natural communities are provided on Figure 8. Acreages of each natural community or habitat type are provided in Table 6. Natural community mapping and characterization were accomplished by the Alabama Natural Heritage Program (Schotz 2007). A summary of refuge habitat types is provided below; a more detailed description of the refuge's natural communities can be found in the refuge Habitat Management Plan (USFWS 2007).

**Table 6. Cahaba River NWR habitat types and acreages**

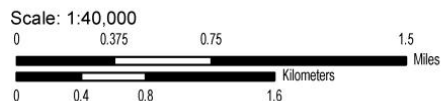
Habitat Types	Acreage
Interior longleaf pine woodland	1,232
Loblolly pine plantation	1,086
Oak, hickory, and iris forest	910
Longleaf pine plantation	215
Open Water (Riverine)	72
Beech, oak, laurel and azalea forest	71
Cahaba lily and water willow shoals	41
Canebrake	21
Oak, holly, and sparkleberry forest	12
Oak, beech and sedge forest	8
Cahaba riverwash herbaceous vegetation	7
Tuliptree and sensitive fern forest	6
<b>Total</b>	<b>3,681</b>



**Figure 8. Cahaba River NWR habitat types and locations**



Produced for the Division of Planning  
 Current to October 2013  
 Imagery: ArcGIS Online 2013  
 Habitat: USFWS Expansion GAP Data 2010



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## Interior Longleaf Pine Woodland

This fire-dependent community, covering approximately 1,232 acres, has longleaf pine (*Pinus palustris*) as the dominant tree species. It typically includes the following plant associations: shortleaf pine (*P. echinata*), Virginia pine (*P. virginiana*), blackjack oak (*Quercus marilandica*), chestnut oak (*Q. prinus*), and Blue Ridge blueberry (*Vaccinium pallidum*). Longleaf pine is a key tree species in a complex, fire-dependent ecosystem. These forests primarily owe their existence to lightning-related wildfires, which were augmented by Native American practices of burning the forest. Pre-settlement forests are believed to have evolved through lightning fires that occurred from May through July (Brown and Smith 2000) at an interval of 2 to 8 years (Outcalt 2000). Currently, this habitat type occupies approximately 1,232 acres. Historically, this association may have occupied a significant portion of the refuge, but is now limited to remnants along the highest and most inaccessible ridges. Refuge communities (Figure 8) that include planted pine forest (both loblolly and longleaf) and native longleaf pine woodlands likely represent the historical distribution of longleaf pine on the refuge. Remaining refuge longleaf stands are generally in poor condition with little resemblance to their former stature or composition, likely the result of historical fire suppression. The single exception to this generalization includes a mosaic of second-growth natural longleaf pine stands on lands referred to as the Belcher Tract. These scattered second-growth stands range to 40 years in age and provide the best example of longleaf pine woodlands on the refuge. Georgia aster (*Symphotrichum georgianum*) is one of the rare plant species likely to be found in this habitat. This habitat historically supported numerous rare wildlife species, including red-cockaded woodpeckers (*Picoides borealis*), pine snakes (*Pituophis melanoleucus*), and southern fox squirrels (*Sciurus niger niger*).

## Loblolly Pine Plantation

Planted pine plantations have been established on upland areas throughout the refuge and total about 1,086 acres. Loblolly pine (*Pinus taeda*) plantations were planted prior to refuge establishment by commercial timber companies. Even-aged loblolly pine plantations were planted on uplands, both east and west of the river, prior to refuge establishment. Plantations appear to range in age from 10 to 50 years, and all exhibit similar structural and compositional features. Loblolly pine occupies a dominant position in the canopy, with occasional hardwood associates such as tulip tree (*Liriodendron tulipifera*), sweetgum (*Liquidambar styraciflua*), mockernut hickory (*Carya tomentosa*), and southern red oak (*Quercus falcata*). Subcanopy, shrub and the ground cover are highly dependent on the age and density of the loblolly pine canopy.

## Oak, Hickory, and Iris Forest

This association occupies well-drained sites throughout central Alabama, typically occurring on middle to high slopes and ridges. It is common throughout refuge uplands, constituting the prominent forest type along many slopes. On xeric fire-excluded longleaf pine sites, this forest association may represent a first step in succession to a more mesic forest association. Many trees in this forest also benefit from fire to some degree. The canopy is primarily chestnut oak, with white oak, southern red oak, post oak (*Quercus stellata*), and mockernut hickory as co-dominants in many stands. Although of secondary importance, the following are also characteristic trees listed in the approximate order of abundance; shortleaf pine, beech (*Fagus grandifolia*), loblolly pine, black oak, tuliptree (*Liriodendron tulipifera*), sweetgum (*Liquidambar styraciflua*), pignut hickory (*Carya glabra*), red oak (*Quercus rubra*), and water oak (*Quercus nigra*). Understory woody vegetation is usually uniform in distribution, with no particular species

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assuming dominance. In addition to younger individuals of previously described canopy species, characteristic shrubs and trees include sourwood, flowering dogwood, tree sparkleberry, Blue Ridge blueberry, oakleaf hydrangea (*Hydrangea quercifolia*), mountain laurel, hoary azalea (*Rhododendron canescens*), dwarf pawpaw (*Asimina parviflora*), and red buckeye (*Aesculus pavia*). Typical vines include muscadine grape (*Vitis rotundifolia*), briers (*Smilax glauca* and *S. rotundifolia*), and poison ivy (*Toxicodendron radicans*). Rare plant species present include smooth veiny peavine (*Lathyrus venosus*) and Wherry's phlox (*Phlox pulchra*).

### **Longleaf Pine Plantation**

Approximately 215 acres of loblolly pine plantations were clear-cut immediately prior to refuge establishment in 2002. The area was replanted with longleaf pine seedlings during 2004-2005. With periodic fire, this community could eventually resemble a well-established longleaf pine woodland, a process that could take over 100 years.

### **Open Water**

The refuge contains important riverine habitat totaling about 72 acres, including three miles of the Cahaba River as well as several tributary streams, including the Little Cahaba River, Caffee Creek and Little Ugly Creek. The refuge lies near the midpoint of the Cahaba River, approximately 95 river miles from both its headwaters and from its confluence with the Alabama River near Selma. The watershed area upstream of the refuge is approximately 650 square miles. The Cahaba River, as it flows through the refuge, varies from 125 to 250 feet in width, with a water depth from a few inches in the shoals to nearly ten feet in pools. Several small islands are scattered along the course, but the dominant features in the channel are the flat bedrock shoals.

Boulder-strewn Caffee Creek is the largest tributary stream flowing through the refuge and averages 25 feet wide and less than a foot in depth. The southern boundary of the refuge contains a short stretch of the Little Cahaba River. The Little Cahaba River drains nearly 265 square miles with an average width of 50 to 75 feet. The Little Cahaba River flows through the Cahaba Valley district of the Valley and Ridge province whose bedrock is comprised of early Paleozoic limestone and dolomite.

### **Beech, Oak, Laurel, and Azalea Forest**

This habitat covers about 71 acres and is confined to small stream floodplains that empty into either side of the Cahaba River. Based on its elevation of a few feet above the streambed, this community experiences sporadic flooding of a minimal duration. Deep alluvial soils, coupled with occasional flooding, support a strikingly different flora in relation to the hardwood dominated associations of adjacent upland systems. The most characteristic trademark of this small floodplain is the prominence of beech and white oak. Although both species are well represented in the canopy, several hardwood species of similar height are also present in decreasing order of abundance: tuliptree, sweetgum, red maple, pignut hickory, and water oak. The understory contains a variety of low-growing trees and shrubs, such as Florida maple, American hornbeam (*Carpinus caroliniana*), and horse sugar (*Symplocos tinctoria*). The herbaceous component is generally sparse and of moderate diversity, with the following representative species: Christmas fern, giant cane, longleaf spikegrass, cuneate trillium (*Trillium cuneatum*), rue anemone (*Thalictrum thalictroides*), blue phlox (*phlox divaricata*), and bloodroot (*Sanguinaria canadensis*). Llanas are frequent, often climbing into the tops of the tallest trees and include muscadine grape (*Vitis rotundifolia*), Virginia creeper, and cross-vine (*Bignonia capreolata*).

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## Cahaba Lily and Water Willow Shoals

Scattered along the Cahaba River are series of rocky shoals characterized by a prominence of Cahaba lily (*Hymenocallis coronaria*) and water-willow (*Justicia americana*). This habitat covers about 41 acres. Less conspicuous plants include soft rush (*Juncus effusus* var. *solutus*), lizard's-tail (*Saururus cernuus*), and sensitive fern (*Onoclea sensibilis*). Cahaba lilies begin flowering as early as late April and continue into late June, and the prime flowering season typically occurs between the second week of May and the third week of June.

## Canebrake

This plant community (about 21 acres) can be found on low areas along the west side of the Cahaba River near the refuge's southern boundary. While annual flooding typifies this community, this habitat is a successional phase resulting from human or natural intervention and disturbance. Eventually, this community is expected to succeed to an oak-dominated climax forest. Sweetgum and loblolly pine are the primary canopy species, with secondary species including water oak, red maple, sugarberry (*Celtis laevigata*), and American elm (*Ulmus americana*). With the exception of loblolly pine, the understory contains the above canopy species along with trees, shrubs, and vines, such as American hornbeam, Florida maple, box elder (*Acer negundo*), pawpaw (*Asimina triloba*), Chinese privet, poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and Japanese honeysuckle (*Lonicera japonica*). Japanese honeysuckle is a highly invasive exotic plant that can occupy a significant proportion of the community. Because these exotic plants are so pervasive in the forest, native herbaceous plants are now poorly represented. Some of the more common plants include giant cane, wood sedge (*Carex digitalis*), and blue violet (*Viola affinis*).

The southeastern canebrake ecosystem is now considered to be critically endangered with more than 98 percent of this habitat lost (Noss et al. 1995). Historically, cane was a prominent feature of the Cahaba River basin. These expansive canebrakes were described as being an almost impenetrable wilderness, always in view by Bartram (Bartram 1791) during his wanderings in the southeastern United States. By 1901 (Mohr 1901), it was described as a rapidly declining habitat type due to conversion of the fertile, alluvial bottomlands to agriculture and the conversion of uplands for grazing. By 1928 (Harper 1928), the vast canebrakes had all but disappeared. Today, there are remnant populations of cane as understory plants within forested areas and in small pockets along isolated portions of the bottomland forests.

Canebrakes important ecological role is beginning to be better understood, and it is believed to have supported over 50 species, including several species of butterflies that are bamboo specialists (Platt et al. 2001). It serves as habitat for a number of associated bird species (Platt et al. 2001), including the critically endangered and possibly extinct (USFWS 2005b) Bachman's warbler (*Verivora bachmanii*) and Swainson's warbler (*Limnothlypis swainsonii*) (Eddleman et al. 1980, Thomas et al. 1996, Platt et al. 2001). Additionally, giant cane growing in riparian buffers enhances water quality and stabilizes streambanks, reducing nitrates and sediments in groundwater and overland flow because of its dense mat of culms and rhizomes (Schoonover 2001, Schoonover and Williard 2003).

## Oak, Holly, and Sparkleberry Forest

At about 12 acres, this habitat is primarily confined to the Gulf Coastal Plain; this association assumes a sporadic distribution along its northern range in central Alabama. The occurrence of this community on the refuge is restricted to relatively level areas along the west side of the Cahaba River and Caffee Creek, where alluvial deposition has influenced and defined the plant life. The prominence of upland laurel oak, water oak, and loblolly pine in the canopy layers distinguish this association from others on



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the refuge. Similarly, a suite of secondary species are also represented, the canopy and subcanopy, further indicating an affiliation with the Gulf Coast region. Some of the characteristic trees include shortleaf pine, tulip tree, white oak, sand post oak (*Quercus margarettiae*), and hop hornbeam. The shrub component includes typical species such as sweetleaf, American holly, tree sparkleberry, and flowering dogwood, as well as, titi (*Cyrilla racemiflora*), a component of wetlands along the Gulf Coast. Herbs, which are few and sparse, include tread-softly, dwarf iris, longleaf spikegrass (*Chasmanthium sessiliflorum*), and giant cane (*Arundinaria gigantea* var. *gigantea*).

### **Oak, Beech, and Sedge Forest**

While present throughout the mountain region of north Alabama, this habitat type is less common in the central part of the State. At about eight acres, it is rather rare on the refuge, confined only to the steep, rocky, north- to east-facing slopes overlooking Caffee Creek and along an unnamed, west flowing tributary on the refuge's northern boundary. Fire may enter this more mesic forest association, but probably burns at low intensity or becomes extinguished, minimizing any fire-related effects. The canopy is characterized by varying degrees of co-dominance by white oak, beech, and tulip tree, with each species attaining prominence on occasion. Seldom absent from the canopy and of secondary importance are loblolly pine, sweetgum, white basswood (*Tilia americana* var. *heterophylla*), chestnut oak (*Quercus montana*), southern red oak (*Q. falcata*), and water oak (*Q. nigra*). The subcanopy is relatively diverse, containing smaller canopy species along with blackgum (*Nyssa sylvatica*), bigleaf magnolia (*Magnolia macrophylla*), hop hornbeam (*Ostrya virginiana*), and American holly (*Ilex opaca*). Mountain laurel (*Kalmia latifolia*) can be found in the shrub layer, often establishing nearly impenetrable stands. Herbs are generally sparse, with Christmas fern, marginal wood fern (*Dryopteris marginalis*), and painted sedge (*Carex picta*).

### **Cahaba Riverwash Herbaceous Vegetation**

Scouring by Cahaba River has created and maintained this boulder- and cobble-strewn substrate, which is vegetated with grasses and forbs along with scattered low-growing trees and shrubs, covering about seven acres. Big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and switchgrass (*Panicum virgatum*) are the principal vegetation cover, with total vegetation cover nearing 40 percent of the ground's surface. Though of lesser significance, woody species also serve to distinguish this association, most of which are stunted and contorted, bearing testimony to the ecological importance and abrasive force of flooding. Typical small trees and shrubs include river birch (*Betula nigra*), black willow (*Salix nigra*), Carolina willow (*S. caroliniana*), green ash (*Fraxinus pennsylvanica*), and buttonbush (*Cephalanthus occidentalis*).

### **Tulip Tree and Sensitive Fern Forest**

On the refuge, this habitat type is confined to bottomlands along the Cahaba River, particularly along the western side of the river. It currently occupies about six acres. The canopy is often characterized by sweetgum, tulip tree, and water oak, with loblolly pine and white oak of secondary importance. The subcanopy, although well represented, is generally patchy, attaining its greatest development in forest openings and typically includes Florida maple (*Acer barbatum*), American hornbeam (*Carpinus caroliniana*), winged elm (*Ulmus alata*), and black cherry (*Prunus serotina*). Chinese privet (*Ligustrum sinense*), an exotic invasive shrub, is prevalent throughout the community, creating nearly monotypic stands, often to the exclusion of native shrubs and herbaceous plants. The ground cover, though generally sparse, is characterized by flora typical of regional bottomlands, with common species including sensitive fern, long-leaf spikegrass (*Chasmanthium sessiliflorum*), giant cane (*Arundo donax*), and wild garlic (*Allium vineale*).

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## WILDLIFE

### Invertebrates

#### Mussels

Within North America, there are approximately 300 species of freshwater mussels. Alabama has supported 178 (59 percent) of these species, and the Cahaba River has supported 50 (17 percent) (Williams et al. 2008). Freshwater mollusks are one of the most imperiled groups of organisms in the world. Over half of all known or presumed aquatic animal extinctions in the United States since European settlement have been freshwater mussels and snails unique to the Mobile Basin (USFWS 2000). Only 75 percent of snail species and 71 percent of mussels, historically occurring in Alabama, are thought to still exist today. Of these remaining species, 35 percent of snails and 31 percent of mussels are considered secure (Lydeard and Mayden 1995). The remaining species are imperiled to varying degrees, ranging from relict populations no longer reproducing to widespread species suffering from declining population levels.

Mussels within the Cahaba River system have declined from 51 to 37 species over the past 70 years (Paul D. Johnson, personal communication). Three of the 37 remaining species are federally listed and three additional species are considered of high or highest conservation concern by the State of Alabama (Table 7). Of the 14 freshwater mussel species that have been lost from the Cahaba River system, two species are likely extinct, while 12 species are extirpated from the system, or from the state, but found elsewhere within their range (Table 9). Nine of twelve extirpated species (75 percent) are either federally listed or considered by the state to be of high or highest conservation concern.

**Table 7. Freshwater mussels currently found in the Cahaba River Basin**

Scientific Name	Common Name	Federal Status	State Status
<i>Amblema elliotii</i>	Coosa Fiveridge		
<i>Amblema plicata</i>	Threeridge		
<i>Anodonta suborbiculata</i>	Flat Floater		
<i>Ellipsaria lineolata</i>	Butterfly		
<i>Elliptio arca</i>	Alabama Spike		
<i>Elliptio arctata</i>	Delicate Spike		P1
<i>Elliptio crassidens</i>	Elephantear		
<i>Fusconaia cerina</i>	Gulf Pigote		
<i>Fusconaia ebena</i>	Ebonysell		
<i>Hamiota altilis</i>	Fine-lined Pocketbook	T	P2
<i>Hamiota perovalis</i>	Orange-nacre Mucket	T	P2
<i>Lampsilis ornate</i>	Southern Pocketbook		
<i>Lampsilis straminea</i>	Southern Fatmucket		

Scientific Name	Common Name	Federal Status	State Status
<i>Lampsilis teres</i>	Yellow Sandshell		
<i>Lasmigona alabamensis</i>	Alabama Heelsplitter		WATCH
<i>Lasmigona etowaensis</i>	Southern Toesplitter		P1
<i>Leptodea fragilis</i>	Fragile Papershell		
<i>Megaloniaias nervosa</i>	Washboard		
<i>Obliquaria reflexa</i>	Threehorn Wartyback		
<i>Plectomerus dombeyanus</i>	Bankclimber		
<i>Pleurobema decisum</i>	Southern Clubshell	E	
<i>Pleurobema perovatum</i>	Ovate Clubshell	E	
<i>Potamilus purpuratus</i>	Bleufer		
<i>Ptychobranchnus foremanianus</i> <sup>3</sup>	Rayed Kidneyshell	E	P1
<i>Pyganodon grandis</i>	Giant Floater		
<i>Quadrula apiculata</i>	Southern Mapleleaf		
<i>Quadrula asperata</i>	Alabama Orb		
<i>Quadrula metanevra</i>	Monkeyface		WATCH
<i>Quadrula rumphiana</i>	Ridged Mapleleaf		
<i>Quadrula verrucosa</i>	Pistolgrip		
<i>Strophitus connasaugaensis</i>	Alabama Creekmussel		WATCH
<i>Toxolasma corvunculus</i>	Southern Purple Lilliput		P1
<i>Truncilla donaciformis</i>	Fawnsfoot		WATCH
<i>Uniomereus tetralasmus</i>	Pondhorn		
<i>Villosa lienosa</i>	Little Spectaclecase		
<i>Villosa nebulosa</i>	Alabama Rainbow		WATCH
<i>Villosa vibex</i>	Southern Rainbow		

Key: T = Threatened, E= Endangered, P1 = Highest Conservation Concern, P2 = High Conservation Concern, Watch = Moderate Conservation Concern

<sup>3</sup>The Service currently considers the Triangular Kidneyshell - *Ptychobranchnus grenii* to be the same species as the Rayed Kidneyshell. Reclassified in Williams et al. 2008.

**Table 8. Extinct and extirpated mussels of the Cahaba River Basin**

<b>Scientific Name</b>	<b>Common Name</b>
<i>Anodontooides radiatus</i>	<b>Rayed Creekshell</b>
<i>Epioblasma metastrata</i>	<b>Upland Combshell</b>
<i>Epioblasma othcaloogensis</i>	<b>Southern Acornshell</b>
<i>Epioblasma penita</i>	<b>Southern Combshell</b>
<i>Ligumia recta</i>	<b>Black Sandshell</b>
<i>Medionidus acutissimus</i>	<b>Alabama Moccasinshell</b>
<i>Medionidus parvulus</i>	<b>Coosa Moccasinshell</b>
<i>Obovaria jacksoniana</i>	<b>Southern Hickorynut</b>
<i>Obovaria unicolor</i>	<b>Alabama Hickorynut</b>
<i>Pleurobema rubellum</i>	<b>Warrior Pigtoe</b>
<i>Pleurobema taitianum</i>	<b>Heavy Pigtoe</b>
<i>Pleurobema verum</i>	<b>True Pigtoe</b>
<i>Potamilus inflatus</i>	<b>Inflated Heelsplitter</b>
<i>Utterbackia imbecillis</i>	<b>Paper Pondshell</b>

### Snails

There are 342 species of gill-breathing freshwater snail species throughout North America. The aquatic habitats of Alabama support habitat for 147 (43 percent) of the gill-breathing freshwater snail species, while the Cahaba River supports habitat for 31 (9 percent). Three species of snails within the Cahaba River are federally listed, six additional species are considered by the state as species of high or highest conservation concern, and four additional species are considered critically imperiled, imperiled, or vulnerable. One species of snail, Cahaba pebblesnail (*Clappia cahabensis*), was believed to have become extinct until rediscovered in the Cahaba River, within Cahaba River NWR, in 2005. Many of the remaining species of gill-breathing freshwater snail species are limited in distribution or suffer from declining populations.

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## Fish

Alabama's rivers and streams are inhabited by one of the richest fish faunas in North America, numbering around 300 freshwater species (Mirarchi et al. 2004). Continuing development within the state, however, has placed stress on many of these populations, particularly those fish that depend on a free-flowing river system. Navigational and hydrological dams have inhibited upstream migration of fish. Maintenance dredging has eliminated sand and gravel bars important for spawning and has blocked many stream mouths. Pulse releases from hydroelectric dams have adversely altered tailwater habitat and water quality conditions, and sediments and eutrophication have adversely impacted fish populations throughout the state. Ongoing industrial growth and urban development can be expected to place further stress on these populations in future years.

As Alabama's longest free-flowing river, the Cahaba has escaped some of these impacts. Water quality degradation, sedimentation, and hydrologic modification of stream flows, however, continue to place stress on fish populations. Exotic fish species currently are not considered a significant environmental problem in the refuge area (Garland 2006).

Fish "Species of Concern" documented on the refuge include rock darter, Cahaba shiner, skygazer shiner, and goldline darter. Only the Cahaba shiner and goldline darter are federally endangered or threatened species. The two federally listed fish are discussed in further detail in the section on Rare, Threatened, and Endangered Species.

## Reptiles and Amphibians

Alabama reptiles and amphibians total 154 species, which include 30 frogs, 43 salamanders, 12 lizards, 40 snakes, 28 turtles, and the alligator (Mirarchi et al. 2004). The Ridge and Valley Physiographic Province is somewhat unique in that this region seems to support a higher percentage of Coastal Plain species than other regions north of the Fall Line (Mount 1975). Potential reptiles and amphibians that may inhabit the refuge are provided in Appendix I: Refuge Biota.

## Birds

Alabama provides critical nesting, wintering, and migrating habitats for a large number of birds. A total of 420 species have been documented in the state. Of these, 158 have been documented to regularly nest in the state. Additionally, 174 species regularly winter, and 80 species migrate through Alabama (Mirarchi et al. 2004). A list of birds that potentially nest or migrate through the refuge is provided in Appendix I: Refuge Biota.

The Alabama Breeding Bird Atlas project is systematically documenting breeding birds according to USGS Topographic Quadrangles in the state (Alabama Ornithological Society (AOS) 2006). To date, 84 birds have been recorded during late May and June within the West Blocton East Topographic Quadrangle. Birds recorded for the Breeding Bird Atlas that are designated as "Species of Concern" include Mississippi kite, bald eagle, Cooper's hawk, Kentucky warbler, wood thrush, and Swainson's warbler.

## Mammals

The mammals found on the refuge are likely to include those that are relatively common statewide. Bobcats (*Lynx rufus*) are the largest native predators on the refuge and will be found in a variety of habitats. Smaller predators include the opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), and

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otter (*Lutra canadensis*). Conspicuous herbivores include white-tailed deer (*Odocoileus virginianus*), beaver (*Castor canadensis*), gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), and cottontail rabbits (*Sylvilagus floridanus*). In addition, numerous species of rats, mice, voles, bats, shrews, and moles occupy various habitats on the refuge.

#### *RARE, THREATENED, AND ENDANGERED SPECIES*

The Cahaba River NWR supports a number of rare, threatened, and endangered animals and plants (Table 9). The majority of federally listed species include mussels, snails, and fish. At least 37 species of plants within the Cahaba River watershed are considered vulnerable, imperiled, or critically imperiled; including three federally listed species (NatureServe 2011).

**Table 9. Rare, threatened, and endangered species found on Cahaba River NWR**

Common Name	Scientific Name	Status			Refuge Location
		Federal(1)	State (2)	TNC (3)	
<b>Mammals</b>					
<b>Gray Bat</b>	<i>Myotis grisecens</i>	E	SP,P1	S2	Suspected to forage along the river and larger tributary streams.
Indiana Bat	<i>Myotis sodalis</i>	E		S2	Not documented on refuge but within habitat range.
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	T		S2	Not documented on refuge but within habitat range.
<b>Eastern Fox Squirrel</b>	<i>Sciurus niger</i>			S3	Highly Suspected - Mature longleaf and shortleaf pine forests in the Belcher Tract
<b>Birds</b>					
<b>Mississippi Kite</b>	<i>Ictinia mississippiensis</i>			S3	Recorded for Breeding Bird Atlas on or just east of the refuge (AOS 2006)
<b>Bald Eagle</b>	<i>Haliaeetus leucocephalus</i>		SP	S3	Observed during breeding season for Breeding Bird Atlas on or just west of refuge (AOS 2006)
<b>Cooper's Hawk</b>	<i>Accipiter cooperii</i>		SP	S3	Recorded for Breeding Bird Atlas on or just east of refuge (AOS 2006)

Common Name	Scientific Name	Status			Refuge Location
		Federal(1)	State (2)	TNC (3)	
<b>Swainson's Warbler</b>	<i>Limnothlypis swainsonii</i>		P2	S3	Recently fledged young were recorded for the Breeding Bird Atlas on or just NE of the refuge (AOS 2006)
<b>Kentucky Warbler</b>	<i>Oporornis formosus</i>		P2		Seen, heard or recently fledged young recorded the Breeding Bird Atlas throughout West Blockton East Quad (AOS 2006)
<b>Wood Thrush</b>	<i>Hylocichla mustelina</i>		P2		Seen, heard or territorial behavior recorded for the Breeding Bird Atlas throughout West Blockton East Quad (AOS 2006)
<b>Fish</b>					
<b>Blue Shiner</b>	<i>Cyprinella caerulea</i>	T	SP,P2	S1	Probably extirpated from Cahaba River, but establishment of a viable population in the river is required in the Recovery Plan (USFWS 1995) for delisting.
<b>Rock Darter</b>	<i>Etheostoma rupestre</i>			S4	Common in Cahaba and Black Warrior river systems (NatureServe 2011) and recorded as a single population in the central portion of the refuge (ANHP 2006).
<b>Cahaba shiner</b>	<i>Notropis cahabae</i>	E	SP,P1	S2	Cahaba endemic (NatureServe 2011) and recorded as five populations on refuge (ANHP 2006)



Common Name	Scientific Name	Status			Refuge Location
		Federal(1)	State (2)	TNC (3)	
<b>Skygazer Shiner</b>	<i>Notropis uranoscopus</i>			S2	Alabama endemic recorded on southern portion of refuge (ANHP 2006) and recognized as more common downstream (NatureServe 2011)
<b>Goldline Darter</b>	<i>Percina aurolineata</i>	T	SP,P1	S1	Rare and local in Cahaba River (NatureServe 2011) with a single population recorded in the central portion of the refuge (ANHP 2006)
<b>Mussels</b>					
<b>Delicate Spike</b>	<i>Elliptio arctata</i>		P1	S2	Widespread but uncommon in Mobile River Basin (Mirarchi et al. 2004) and collected at Caffee Creek Shoals during recent refuge survey (Hartfield 2004)
<b>Gulf Pigtoe</b>	<i>Fusconaia cerina</i>			S4	Widespread Mobile River Basin endemic (Mirarchi et al. 2004) with dead/live shells collected at Upper and Caffee Creek Shoals during recent refuge survey (Hartfield 2004)
<b>Fine-lined Pocketbook</b>	<i>Lampsilis altilis</i>	T	P2	S2	Rapidly declining mussel (Nature Serve 2011) with a single fresh dead shell collected at Caffee Creek Shoals during recent refuge survey (Hartfield 2004)

Common Name	Scientific Name	Status			Refuge Location
		Federal(1)	State (2)	TNC (3)	
<b>Southern Pocketbook</b>	<i>Lampsilis ornata</i>			S4	Relatively abundant and widespread within Mobile River Basin (NatureServe 2011) with collections at Upper and Caffee Creek Shoals during recent refuge survey (Hartfield 2004)
<b>Alabama Heelsplitter</b>	<i>Lasmigona complanata alabamensis</i>			S3	Endemic to Mobile River Basin (Mirarchi et al. 2004) with a single mussel collected at Upper Shoals during recent refuge survey (Hartfield 2004)
<b>Triangular Kidneyshell</b>	<i>Ptychobranthus greeni</i> *	E	SP,P1	S1	Rapidly declining mussel (NatureServe 2011) that has not been collected on the refuge, but has been found in previous surveys both north and south of the refuge (Hartfield 2004)
<b>Pistolgrip</b>	<i>Tritogonia verrucosa</i>			S4	Fairly common in Mobile River Basin (Mirarchi et al. 2004) with a few dead shells collected at Upper Shoals during recent refuge survey (Harfield 2004)
<b>Little Spectaclecase</b>	<i>Villosa lienosa</i>			S4	Although not collected during recent refuge surveys, this mussel has been collected from the Cahaba in the past (Hartfield 2004). Considered common in Alabama (Mirarchi et al. 2004)

Common Name	Scientific Name	Status			Refuge Location
		Federal(1)	State (2)	TNC (3)	
<b>Southern Rainbow</b>	<i>Villosa vibex</i>			S4	Common in Alabama (Mirarchi et al. 2004) with collections at Upper Shoals during recent refuge survey (Hartfield 2004)
<b>Snails</b>					
<b>Ample Elimia</b>	<i>Elimia ampla</i>		P2	S1	Cahaba River endemic found between Centerville and Booth Ford, Shelby County (NatureServe 2011) and recorded as two populations on the refuge (ANHP 2006) and at Upper Shoals in recent refuge survey (Hartfield 2004)
<b>Cahaba Pebblesnail</b>	<i>Clappia cahabensis</i>		P1	S1	Presumed extinct and rediscovered on the refuge in 2005 (NatureServe 2011)
<b>Lilyshoals Elimia</b>	<i>Elimia annettae</i>		P2	S1	Cahaba River endemic found between Lily Shoals and Pratt's Ferry (NatureServe 2011) and recorded on the refuge as a single population by ANHP (2006) and at Upper and Caffee Shoals (Harfield 2004) in a recent refuge survey

Common Name	Scientific Name	Status			Refuge Location
		Federal(1)	State (2)	TNC (3)	
<b>Cahaba Elimia</b>	<i>Elimia cahawbensis</i>			S3	Endemic and common in Mobile River Basin (Mirarchi et al. 2004), recorded by ANHP (2006) as four populations on the refuge, and collected at Caffee Creek in a recent refuge survey (Hartfield 2004)
<b>Riffle Elimia</b>	<i>Elimia clara</i>			S2	Endemic and common to Cahaba River (Mirarchi et al. 2004), recorded by ANHP (2006) as two populations on the refuge, and collected at Upper and Caffee Creek Shoals in recent refuge survey (Hartfield 2004)
<b>Compact Elimia</b>	<i>Elimia showalteri</i>			S1	Endemic to Cahaba River (Mirarchi et al. 2004), recorded by ANHP (2006) as three populations on the refuge, and collected at Upper and Caffee Creek Shoals in recent refuge survey (Hartfield 2004)
<b>Puzzle Elimia</b>	<i>Elimia varians</i>		P2	S1	Rapidly declining Cahaba River endemic found between Marvel and Centreville in Bibb County (NatureServe 2011), and recorded by ANHP (2006) as a single population at Upper Shoals
<b>Round Rocksnail</b>	<i>Leptoxis ampla</i>	T	SP,P2	S1	Found in Cahaba River shoals and three isolated tributary streams off refuge (NatureServe 2011), recorded by ANHP (2006) and Harfield (2004) at Upper and Caffee Creek Shoals on refuge.

Common Name	Scientific Name	Status			Refuge Location
		Federal(1)	State (2)	TNC (3)	
<b>Flat Pebblesnail</b>	<i>Lepyrium showalteri</i>	E	SP,P1	S1	Highly Suspected - Mobile River Basin endemic currently known only from sites above and below refuge (Mirarchi et al. 2004)
<b>Cylindrical Lioplax</b>	<i>Lioplax cyclostomaformis</i>	E	SP,P1	S1	Currently only know from 15 miles of the Cahaba above the Fall Line (Mirarchi et al 2004) and collected from Upper and Caffee Creek Shoals during recent refuge survey (Hartfield 2004)
<b>Smooth Hornsnail</b>	<i>Pleurocera prasinata</i>			S1	Common endemic of Mobile River Basin (Mirarchi 2004) with collections at Upper and Caffee Creek Shoals during recent refuge surveys (Hartfield 2004)
<b>Insects</b>					
<b>Caddisfly</b>	<i>Hydropsyche hageni</i>			S2	Collected near County Road 24 Bridge and Little Ugly Creek (Harris et al. 1984)
<b>Plants</b>					
<b>Georgia Rockcress</b>	<i>Arabis georgiana</i>	T		S1	One population in the southern part of the refuge near Little Cahaba River called Fern Glade.
<b>Whiteleaf Leatherflower</b>	<i>Clematis glaucophylla</i>			S4	Along steep east banks of the Cahaba River in the northern section of the refuge

Common Name	Scientific Name	Status			Refuge Location
		Federal(1)	State (2)	TNC (3)	
<b>Spring Coralroot</b>	<i>Corallorhiza wisteriana</i>			S2	Along western side of river south of Caffee Creek
<b>Alabama Croton</b>	<i>Croton alabamensis</i> var. <i>alabamensis</i>			S3	Two populations recorded in upland forest on southeast part of refuge
<b>Soapwort gentian</b>	<i>Gentiana saponaria</i>			S3	
<b>Striped gentian</b>	<i>Gentiana villosa</i>			S3	
<b>Cahaba Lily</b>	<i>Hymenocallis coronaria</i>			S2	Dominant plant within the three shoals on refuge
<b>Smooth Veiny Peavine</b>	<i>Lathyrus venosus</i>			S1	Steep slopes along both east and west sides of river
<b>Maidenbush</b>	<i>Leptopus phyllanthoides</i>			S2	Scoured areas along the river north of Caffee Creek
<b>Southern twayblade</b>	<i>Listera australis</i>			S3	
<b>Mohr's Barbara's-Button</b>	<i>Marshallia mohrii</i> Beadle	T		S3	Plants are widely scattered in an open glade on McDorman Tract
<b>Broadleaf Barbara's Button</b>	<i>Marshallia trinervia</i>			S3	Along tributary stream bottoms both east and west of river
<b>Slender bunchflower</b>	<i>Melanthium latifolium</i>			S1	

Common Name	Scientific Name	Status			Refuge Location
		Federal(1)	State (2)	TNC (3)	
American pinesap	<i>Monotropa hypopithys</i>			S2	
Wherry's Phlox	<i>Phlox pulchra</i>			S2	Along County Road 24 and northern sections of River Road
Nevius' Stonecrop	<i>Sedum nevii</i>			S3	Historic record east of river on northern part of refuge
Elliott's fanpetals	<i>Sida elliotii</i>			S3	
Gentian pinkroot	<i>Spigelia gentianoides</i> var. <i>alabamensis</i>	E		S1	Plants are widely scattered in an open glade on McDorman Tract.
Silky camellia	<i>Stewartia malacodendron</i>			S2	

Key:

(1) E=Federally Listed Endangered, T=Federally Listed Threatened, C=Candidate for Federal Listing, PT=Proposed Threatened.

(2) SP=State Protected, P1=Species of Highest Conservation Concern, P2=Species of High Conservation Concern (Conserving Alabama's Wildlife: A Comprehensive Strategy).

(3) Nature Conservancy Heritage Ranking system - S1=Critically imperiled in Alabama because of extreme rarity or because of some factors making it especially vulnerable to extirpation from Alabama, S2=Imperiled in state because of rarity or because of some factors making it very vulnerable to extirpation from Alabama, S3=Rare or uncommon in Alabama, S4=Demonstrably secure in Alabama and essentially ineradicable under present conditions, S5=Secure.

\*The Service currently considers the Triangular Kidneyshell - *Ptychobrancus grenii* to be the same species as the Rayed Kidneyshell - *Ptychobrancus foremanianus*.

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A synopsis of each federally listed species is provided below.

### **Gray Bat**

The endangered gray bat (*Myotis grisecens*) is a year-round cave resident, occupying cold hibernating caves (hibernacula) in winter and warm caves in summer (Gore 1992). Gray bats forage primarily over water where flying insects are abundant (Tuttle 1979). Forested areas surrounding caves or located between caves and foraging habitat are important for gray bat survival, as these areas serve as corridors for travel and as protective feeding cover for young bats as they begin to forage outside their cave (USFWS 1982). Although many of the major hibernation and maternity caves have been protected, gray bats continue to be at risk, primarily from white-nose syndrome (USFWS 2009b), an infectious fungal disease new to the United States which is decimating several other bat species (Cohn 2008, Blehert et al. 2009, Gargas et al. 2009). It is believed that gray bats forage along the Cahaba River in the vicinity of the refuge. In 2009, surveys were conducted on the refuge and gray bats calls were heard.

### **Indiana Bat and Northern Long-eared Bat**

Though the refuge is located in the habitat range for the endangered Indiana Bat (*Myotis sodalis*) and the threatened Northern Long-eared Bat (*Myotis septentrionalis*); neither species have been documented on the refuge.

### **Blue Shiner**

The blue shiner (*Cyprinella caerulea*) is a threatened fish whose historic range included two major rivers within the Mobile Basin, the Cahaba and Coosa, but is believed to have been extirpated from the Cahaba River (USFWS 1995). It is found only in flowing water and prefers sand and/or sand and gravel substrate sometimes with cobble, low-to-moderate velocity current, and a depth of about 0.5 to 3 feet (Pierson and Krotzer 1987, Dobson 1994). Although the exact causes of blue shiner declines are unknown, there is strong circumstantial evidence that water quality degradation was a major factor. Reductions in water quality, such as nitrification and probable low dissolved oxygen levels, coincided with extirpation of the blue shiner and other aquatic species from the Cahaba River (Pierson and Krotzer 1987).

### **Cahaba Shiner**

In 1977, critical habitat was proposed for the endangered Cahaba shiner (*Notropis cahabae*) along sections of the Cahaba River and Little Cahaba River (42 FR 60765-60768; [http://ecos.fws.gov/docs/federal\\_register/fr170.pdf](http://ecos.fws.gov/docs/federal_register/fr170.pdf)). Critical habitat was not established for the Cahaba shiner. This species has undergone a dramatic range reduction. Formerly collected along 76 miles of the Cahaba River (Ramsey 1982, Pierson et al. 1989), the Cahaba shiner's present known range of about 60 miles extends from 3 miles northeast of Heiberger in Perry County (Pierson et al. 1989) to 3.75 miles above Booth Ford in Shelby County (Howell et al. 1982). This represents a range reduction of over 20 percent that occurred between 1969 and 1977 (Ramsey 1982). Further population reductions are evident, as the stronghold for the species is now limited to about 15 river miles between the Fall Line and Piper Bridge in Bibb County (USFWS 1992). This species has been documented on the refuge as recently as 2009 (J. Powell, USFWS, Pers. Comm., July 2011). The habitat of the Cahaba shiner appears to be large shoal areas in the main channel of the Cahaba River. The species is also found in the quieter waters, less than 1.6 feet deep, just below swift riffle areas (Howell et al. 1982). The Cahaba shiner seems to prefer sandy patches in gravel beds or downstream of larger rocks and boulders. The species is generally found in relatively clear, well-



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oxygenated water. Degradation of water quality is believed to have the greatest adverse impact to the Cahaba shiner (O'Neil 1983).

### **Goldline Darter**

The threatened goldline darter (*Percina aurolineata*) is known from only two disjunct areas: the Cahaba River and the Coosawater River (Georgia) (Boschung and Mayden 2004). As early as 1977, critical habitat was proposed for this species along the main channel of the Cahaba River from the U.S. Highway 31 crossing just south of Birmingham to the U.S. Highway 82 crossing at Centreville (42 FR 60765-60768; [http://ecos.fws.gov/docs/federal\\_register/fr170.pdf](http://ecos.fws.gov/docs/federal_register/fr170.pdf)). However, the proposed ruling was not authorized, and critical habitat was not established. Goldline darters have been documented on the refuge as recently as 2009 (J. Powell, USFWS, Pers. Comm., July 2011). This species typically inhabits streams with moderate to swift currents, and generally prefers sand, gravel, and cobble substrates (Boschung and Mayden 2004). Goldline darters are particularly vulnerable to siltation, and water quality degradation is the primary reason for its population decline (USFWS 2000, Boschung and Mayden 2004).

### **Fine-lined Pocketbook**

The threatened fine-lined pocketbook (*Hamiota altilis*), formerly *Lampsilis altilis* (Roe and Hartfield 2005), is found in several central and north-eastern counties of Alabama, as well as a few counties in Georgia and Tennessee. However, populations are believed to be small wherever they are found (USFWS 2000). The fine-lined pocketbook was among several species of mussels for which critical habitat was designated in 2004 (see "Critical Habitat" section above). This species is generally found in stable sand, gravel, and cobble substrate in moderate to swift currents (USFWS 2000), and it does not tolerate heavy silt accumulation (Williams et al. 2008). Habitat degradation, sedimentation, eutrophication, and poor water quality are the major factors causing the decline of this species (USFWS 2000).

### **Triangular Kidneyshell**

The triangular kidneyshell (*Ptychobranhus greeni*) is an endangered mussel. Critical habitat was designated in 2004 for this species, as well as several other listed mussels (see "Critical Habitat" section above). The Service currently considers the triangular kidneyshell - *Ptychobranhus grenii* to be the same species as the rayed kidneyshell - *Ptychobranhus foremanianus*. The species has been found in Bibb County above and below refuge boundaries. It is anticipated that the mussel could be found within refuge boundaries.

### **Round Rocksnail**

The threatened round rocksnail (*Leptoxis ampla*) has disappeared from approximately 90 per cent of its historic range as a result of impoundments, channelization, mining, dredging, and water quality degradation. It is currently known from shoals in the Cahaba River, Bibb and Shelby counties, and from the lower reach of the Little Cahaba River, and the lower reaches of Shade and Six-mile creeks in Bibb County. Round rocksnails are gill breathing snails found attached to cobble, gravel, or other hard substrates in the strong currents of riffles and shoals (USFWS 2005a).

### **Flat Pebblesnail**

Historically known from the Coosa, Cahaba River, Little Cahaba rivers (Thompson 1984), the endangered flat pebblesnail (*Lepyrium showalteri*) is now only found in one shoal area of the Cahaba River above the fall line (USFWS 2005a). This species lives on clean, smooth stones in rapid currents of river shoals. Loss of habitat, such as the conversion of shoal habitat to deeper water as the result of dam construction, is one of the major factors causing their decline (USFWS 2005a).

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## Cylindrical Lioplax

The endangered cylindrical lioplax (*Lioplax cyclostomaformis*) was formerly found in several river systems in Alabama and Georgia. However, loss of habitat resulting from dam construction, water quality deterioration, and other factors has dramatically reduced their populations. Currently, this species is only found in the Cahaba River along a 15-mile stretch above the Fall Line (USFWS 2005a). This snail lives under tabular boulders and slabs in moderate to fast current in substrates of mud and shell fragments. It is also found in isolated mud deposits under large rocks in the rapid flowing sections of stream and river shoals (USFWS 2004b).

## Georgia Rockcress

Georgia rockcress is a proposed threatened species with critical habitat that falls within refuge boundaries. This perennial herb can reach up to 90 centimeters (35 inches) tall and is primarily associated with high bluffs along major river courses, with dry-mesic to mesic soils of open rocky woodland and forested slopes. While Georgia rockcress needs small-scale disturbances with slightly increased light, limited competition for water and exposed soils for seed germination, the species is a poor competitor against aggressive, invasive species. The most serious threat to this species' continued existence is habitat degradation associated with timber harvesting, road building, development, and grazing. These activities create favorable conditions for the invasion of nonnative weeds. Thirty-four acres of critical habitat in the southern portion of the refuge (Fern Glade) is proposed for this species (USFWS 2014a Final Rule NOA ).

## Mohr's Barbara's-Button

Mohr's barbara's-button (*Marshallia mohrii*) is a threatened species first described in 1901 by Beadle and Boynton. This member of the sunflower family is an erect perennial herb, 3 to 7 decimeters (1 to 2.3 feet) tall. *Marshallia mohrii* is primarily an inhabitant of open to partially shaded calcareous glades, prairie-like openings, and margins of rock-bedded streams, occasionally expanding into actively maintained roadsides. In central Alabama, a small number of occurrences also inhabit more acidic substrates, largely in association with highway margins and utility corridors. The species is unable to tolerate deep shade and becomes reduced where hardwoods and understory shrubs invade, and probably was maintained naturally through occasional fire or local soil conditions that promoted a relatively closed grass-sedge community (Kral 1983 in ANHP 2014).

Although *Marshallia mohrii* is tolerant to and can benefit from a moderate level of disturbance, excessive habitat modification has and continues to threaten the existence of the species (Kral 1983, U.S. Fish and Wildlife Service 1988, Patrick et al. 1995 – in ANHP 2014). Activities associated with timber production (site preparation, maintenance, logging) appear to be the most pervasive threat to the species, particularly in the Coosa Valley prairie complex in northeast Alabama and adjacent Georgia. Soil disturbances associated with timber harvesting further promote the incursion of undesirable weedy species, reducing long-term viability. However, Kral (1983) and Patrick et al. (1995) assert that canopy removal (hand thinning), if done carefully, will be beneficial to the species. Additionally, vegetation succession as a result of fire exclusion has impacted many sites, particularly those also within the Coosa Valley prairie system. To a lesser extent, exotic species threaten some occurrences (ANHP 2014).

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## Gentian Pinkroot

*Spigelia gentianoides* is composed of two varieties (Gould 1996): *S.gentianoides* var. *gentianoides* (hereafter var. *gentianoides*) restricted to five locations within three counties in the Florida panhandle and southern Alabama, and *S. gentianoides* var. *alabamensis* (USFWS 2012b). *Spigelia gentianoides alabamensis* is known only from the Ketona glade communities of Bibb County in central Alabama. It grows up to one foot tall, in the dry, rocky substrate and produces tubular, pink, upward-pointed blooms during May and June (Davenport and Oberholster 2012).

Habitat loss and alternation has been the primary threat to gentian pinkroot. Factors contributing to this threat include clear-cutting and/or selective thinning, mechanical site preparation, conversion of land to pine plantations, disruption of fire regimes, and permanent habitat loss through development. Strategies include the control of visitor use, restoration, prescribed burning, monitoring and inventoring (USFWS 2012b). Gentian pinkroot is not protected in the State of Alabama (Vivian Negrón-Ortiz, personal comm. 2015). Where it occurs on TNC and Service lands, areas are well-managed and protected. The trends in spatial distribution are not known because basic inventory data (e.g., the total number of individuals, number of flowering vs. non-flowering plants, presence of visitors to the flowers, and whether seedling recruitment is occurring) in addition to the effect of fire on population size for each glade are not currently available or known (USFWS 2012b).

### Species of Concern

## Georgia Aster

Georgia aster is no longer a candidate species for listing but remains a species of concern. It is typically found in dry oak-pine flatwoods and uplands. The primary limiting factor appears to be the availability of light, and although the Georgia aster is a good competitor with other early successional species, it tends to decline when shaded by woody plants (Matthews 1993). Factors contributing to the aster's decline include herbicides, highway construction, fire suppression, and residential and industrial development. Most recently in 2012, plants were located on upland slopes of refuge lands. The refuge is part of a multi-partner Candidate Conservation Agreement for Georgia aster to coordinate efforts actions among state, federal, non-governmental, and private organizations that conserve, manage, and improve Georgia aster populations rang-wide (USFWS 2014b).

## NONNATIVE AND INVASIVE PLANTS AND ANIMALS

The spread of nonnative and invasive species represents one of the most serious threats to biodiversity, undermining the ecological integrity of native habitats and pushing rare species to the edge of extinction. Nonnative species are animals and plants introduced to an area outside their historic range, usually by humans. Invasive species include native animals and plants that have reached population levels where they negatively affect less common species. Typically, invasive species benefit from changes in land use or the reduction of predators as a result of human activities. Often, introduced species lack predators for control or simply out-compete native species. Once established, many exotic species are virtually impossible to eradicate. They have been implicated in the decline of nearly half the imperiled species in the United States. In addition to their biological impacts, invasive species have negative economic consequences and cause billions of dollars in damage each year. Damage and control costs of invasive species in the United States are estimated at more than \$138 billion annually (Pimentel et al. 2005). Furthermore, economic losses can occur due to declines in recreational and tourism revenues (Simberloff 2001).

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Historical land use on refuge lands has ranged from mining and commercial forestry to, in some areas, municipal development (e.g., Piper). These activities have eradicated or heavily disturbed native plant and animal communities in the area. Disturbance and the imbalance of naturally evolved ecological communities is often a primary mechanism for the spread of opportunistic invasive species. While human disturbance on the refuge has been reduced, established exotic species remain a legacy for future resource managers. All exist and, in many cases, are expanding at the expense of less competitive native species.

While there are numerous exotic or nonnative invasive species on the refuge, serious environmental harm is usually associated with a select few. The following species represent some of the more ecologically harmful exotic plants and animals that can be found on the refuge. When possible or feasible, eradication or control will concentrate on these species. Additional species, particularly invasive plants, can be found on the refuge and may also require control efforts in the future.

### **Coyote**

Coyotes (*Canis latrans*) have colonized the eastern United States during the last 100 years and continue to expand their range (Hill et al. 1987). Coyotes are highly opportunistic, generalist feeders, with a varied diet that usually includes rodents, birds, and fruit (Gammons 2004). However, coyotes can also prey on larger species. Although coyotes are not known to seriously impact quail populations (Henke 2002), they can be important predators of deer (Brundige 1993; Patterson and Messier 2003), wild turkey (Ballard 2003), and livestock (Houben 2004).

### **Feral Hog**

A potentially problematic species is the feral hog (*Sus scrofa*). Although feral hogs have not been documented on the refuge, they are known from nearby areas, particularly south of the refuge. In addition to damaging crops and livestock, wild pigs damage forests and other habitats and are a threat to native wildlife. A conservative estimate of the cost of wild pig damage to agriculture and the environment in the United States is \$1.5 billion annually (Hamrick et al. 2011). On the refuge, feral hogs would cause habitat degradation, loss of ground cover, and increase sediment runoff into the river.

### **Asian Clam**

The nonnative Asian clam (*Corbicula fluminea*) can be found in freshwaters throughout the United States. Ecologically, this species can alter benthic substrates and compete with native mussel species for food and space. The clam seems well adapted to disturbed ecosystems and often out-competes more sensitive native mussels. It is more tolerant of polluted environments than most native species, is hermaphroditic and capable of self-fertilization, and the glochidia go through a planktonic stage rather than a host-specific parasitic phase. The Asian clam was ubiquitous during recent surveys (Hartfield 2004), being the only mollusk that was collected at all sampling locations.

Control or elimination of the Asian clam from the Cahaba River is technically not realistic. Resource managers, however, can minimize adverse consequences on native species by assuring water quality, hydrologic flows, and the physical river substrate are protected and improved. The ability of native mussels to effectively compete against the Asian clam is dependent on ensuring healthy populations and suitable habitat.

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## **Brown-headed Cowbird**

While several nonnative birds (e.g., European starling, house sparrow) are known to nest on or near the refuge, potential adverse effects to native birds primarily involve the brown-headed cowbird (*Molothrus ater*), a native and often invasive species. The cowbird is a brood parasite that deposits its eggs in the nests of smaller birds. The cowbird nestlings then typically out-compete their smaller nest mates. During historic times, the cowbird was restricted to the open prairies of the Midwest. As lands were cleared for farms and pastures, the bird moved east to the new more open landscape. Many native eastern birds have never developed strategies for dealing with brood parasitism. Common hosts of the brown-headed cowbird are yellow warblers, song sparrows, red-eyed vireos, chipping sparrows, eastern phoebes, eastern towhees, ovenbirds and common yellowthroats (Erickson 2008).

## **Chinese Privet**

Exotic privet (*Ligustrum sinense*) can form dense shrub thickets in a wide range of habitats, including floodplain forests, woodlands, and upland fields. They out-compete native vegetation eventually forming dense shrub monocultures. They are fast growing, extremely adaptable, thrive in both shade and sun, rapidly spread and produce copious fruit. They have no known biological controls in North America. Once established, privet is extremely difficult to eradicate. Within the refuge, privet can be found in both upland pine plantations and woodlots, and within bottomlands along streams and the river. The most serious infestations, however, occur in low bottomlands and wetlands. Extensive areas along the river and in low cleared areas have been transformed into a shrub monoculture.

## **Kudzu**

Kudzu (*Pueraria montana*) is often characterized as the largest nonwoody weed problem of forest management in the South. It typically occurs in open, disturbed areas such as abandoned fields, roadsides, and forest edges. The vine, however, spreads more rapidly in open areas, and is slowed as kudzu encounters the shade of a forest edge. Although kudzu typically occurs in disturbed habitats, it can invade forest edges, enveloping, suppressing, and eventually killing mature trees. Fire does not seem to be an avenue for controlling Kudzu. In fact, there is some speculation that fire actually promotes seed germination (Harrington et al. 2003).

Kudzu is difficult to eradicate once established. In fact, eradication becomes increasingly difficult with increasing age of the infestation. Generally, elimination of the vine requires frequent defoliation by a single or multiple methods. Mechanical removal, grazing or mowing can be effective if root crowns are accessible. Herbicides can also be effective, but generally require repeated applications to re-growth in successive years (Miller 2003). Kudzu is found at a number of locations on the refuge. Most infestations are located within the former Piper town site or mining area.

## **Mimosa**

Mimosa (*Albizia julibrissin*) grows in a variety of soil types, produces a large seed crop, and readily resprouts. It quickly takes advantage of disturbed areas or reseeds from nearby infestations. While the tree prefers full sunlight and is often seen along roadsides, it can tolerate partial shade environments. It often becomes a serious problem along riparian areas, where it becomes established along scoured shores and seeds are easily transported in water. The seeds remain viable for more than five years (Miller 1999a). Mimosa is found along road sides on the refuge. Most infestations are located within the former Piper town site or mining area.

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## Japanese Honeysuckle

Japanese honeysuckle (*Lonicera japonica*) is an exotic trailing or climbing woody vine that spreads by seeds, underground rhizomes and aboveground runners (Miller 1999b). The vine invades fields, forest edges and openings, disturbed woods, and floodplains. While it prefers open sunlight, the vine is adapted to growing in conditions receiving as little as 25 percent light. It has few enemies in North America and is difficult to control once established. The vine is common throughout the refuge, particularly within disturbed environments and longleaf pine restoration areas. Longleaf restoration involving timber removal and replanting represent a potential for further spreading the vine on refuge uplands.

## Chinese Lespedeza

Chinese lespedeza (*Lespedeza cuneata*) is an aggressive legume introduced from Asia to provide livestock forage, reclaim eroded slopes, and as a seed source for wildlife food plots and roadside planting. The plant is both flood and drought tolerant, and is rarely bothered by insects or disease. The seeds remain viable for up to 20 years and control is extremely difficult once the plant becomes established. Chinese lespedeza is widespread across the refuge, particularly along roadsides and within the former Piper town site. The species, however, is also present to a lesser degree within longleaf pine restoration areas. Fire by itself does not control the plant and can even stimulate further spread. Chinese lespedeza, together with bicolor lespedeza (*Lespedeza bicolor*), are two exotics that will be monitored during the course of longleaf pine restoration programs (Miller 1999c)

## CULTURAL RESOURCES

The Service, like other federal agencies, is legally mandated to inventory, assess, and protect cultural resources located on those lands that the agency owns, manages, or controls. The Service's cultural resource policy is delineated in 614 FW 1-5 and 126 FW 1-3. If a proposed undertaking has the potential to impact cultural resources, the "area of potential effect," is identified to determine the appropriate level of scientific investigation necessary to ensure legal compliance, and a consultation with the pertinent State Historic Preservation Office (SHPO) and federally recognized tribes is initiated.

Much of the Cahaba River contains rugged terrain and the archaeological potential is limited primarily due to slope, however, in areas where the floodplains of the Cahaba River and its tributaries broaden out, the potential for Native American and historic period occupations increases dramatically. Quarries, lithic workshops, petroglyphs, and ephemeral resource extraction, exploitation, and processing camps represent the most probable types of Native American sites seen in the areas away from the floodplains and valleys.

Industrial sites and features associated with the 19th to 20th century commercial mining operations dominate much of the landscapes. These sites and features include mine shafts, foundations, and/or building ruins for mining-related operations, and possible remains of quarters for mine workers, abandoned railroad grades, and/or roads.

Section 106 of the National Historic Preservation Act of 1966, as amended, and Section 14 of the Archaeological Resources Protection Act require the Service to evaluate the effects of any of its actions on cultural resources (e.g., historical, architectural, and archaeological) that are listed or eligible for listing in the National Register of Historic Places (NRHP). In accordance with these regulations, the Service has coordinated the review of this proposal with the Alabama State Historic Preservation Office.

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## **SOCIOECONOMIC ENVIRONMENT**

This section includes employment, income, demographic, and other economic data pertinent to the local and surrounding areas.

### *LOCAL AND REGIONAL ECONOMIC SETTING*

For the purposes of this Draft CCP/EA, the local socioeconomic area of interest (AOI) was defined as Bibb County (which contains the refuge) and adjacent counties (Chilton, Hale, Jefferson, Perry, Shelby, and Tuscaloosa). The AOI encompasses approximately 5,911 square miles. Counties in the AOI range from those that are predominantly rural with scattered cities, to large urban centers such as the city of Birmingham and adjacent suburbs, which dominate Jefferson County.

### *POPULATION*

The refuge lies in Bibb County, an area with a relatively low population density compared to several nearby counties and statewide (Table 10). However, Bibb County grew by 10 percent between 2000 and 2010, with its population rising from 20,826 to 22,915, respectively. At over 36 percent, Shelby County grew the fastest during the 10-year period. In contrast, Hale, Jefferson, and Perry counties declined. In comparison, Alabama grew by 7.5 percent during the 10-year timeframe. Jefferson County remains the most highly urbanized county in the area, with a population density of 591 persons per square mile in 2010, substantially larger than the state average. This figure is the result of the Birmingham metro area, the state's most populous city.

Longer-term population trends show that Alabama's population will continue to rise during the next 25 years, with an overall rate of almost 28 percent (Table 11). In 2035, the state is expected to have a population of 5.6 million people. Projected county population growth rates show a range of values, with Shelby County growing by 127 percent in 2035, and Perry County declining by 5.6 percent. Bibb County is expected to grow by over 50 percent.

**Table 10. Local and regional population estimates, characteristics, and trends (2000 - 2010)**

Demographic Unit	2000		2010		Percent Population Change (2000-2010)
	Residents	Persons per Square Mile	Residents	Persons per Square Mile	
<b>Alabama</b>	4,447,100	87.6	4,779,736	94.2	+7.5
<b>Bibb County</b>	20,826	33.4	22,915	36.8	+10.0
<b>Chilton County</b>	39,593	57.1	43,643	62.9	+10.2
<b>Hale County</b>	17,185	26.7	15,760	24.5	-8.3
<b>Jefferson County</b>	662,047	595.0	658,466	591.8	-0.5
<b>Perry County</b>	11,861	16.5	10,591	14.7	-10.7
<b>Shelby County</b>	143,293	180.3	195,085	245.5	+36.1
<b>Tuscaloosa County</b>	164,875	124.5	194,656	147.0	+18.1

Source: U.S. Census 2011

**Table 11. State and county population trends (2000 – 2040)**

Demographic Unit	2000	2010	2015	2025	2040	Percent Change (2000 to 2040)
<b>Alabama</b>	4,447,100	4,779,736	4,973,386	5,242,423	5,567,024	+16.5
<b>Bibb County</b>	20,826	22,915	23,367	23,971	24,091	+5.1
<b>Chilton County</b>	39,593	43,643	45,718	49,531	54,720	+25.4
<b>Hale County</b>	17,185	15,760	15,214	14,242	12,744	-19.1
<b>Jefferson County</b>	662,047	658,466	660,042	663,326	661,881	+5
<b>Perry County</b>	11,861	10,591	10,031	9,184	8,298	-21.7
<b>Shelby County</b>	143,293	195,085	220,041	266,228	317,209	+62.6
<b>Tuscaloosa County</b>	164,875	194,656	204,654	223,476	246,924	+26.9

Sources: U.S. Census 2011 and The University of Alabama 2012



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## *EMPLOYMENT AND INCOME*

Employment and income data provide insight into the general economic conditions of an area. Labor statistics by industry is summarized in Tables 13 and 14 for 2001 and 2010, respectively. Data is organized by North American Industry Classification System (U.S. Bureau of Labor Statistics 2012a). This data can be used to portray changes in the relative importance of certain industries in terms of employment, over a nine-year period. Some noteworthy changes include the over two-fold rise of construction jobs in Bibb County between 2001 and 2010 (Tables 13 and 14). In Bibb County there was also a slight increase in education and health services jobs. There was a decline in manufacturing positions. Overall, the relative importance of various industries in terms of employment data in Bibb County was similar to that in surrounding counties and statewide. However, Bibb County jobs in professional, business, education, and health services were under-represented (U.S. Bureau of Labor Statistics 2012a). These categories typically include jobs paying higher-than-average salaries.

Average annual incomes for Bibb and surrounding counties in 2001 and 2010 are shown in Table 15. Bibb County average annual incomes rose between 2001 and 2010, but they stayed below the state average. In 2010, average annual incomes in Bibb County were approximately \$33,123, almost \$7,000 less than the state average of \$40,289 in 2010. Local counties with the highest average annual incomes included Jefferson and Perry counties.

Unemployment rose in all counties of the study area as it did across Alabama and the U.S., resulting from the recession that began in December 2007, following precipitous declines in housing, credit, and financial markets (U.S. Bureau of Labor Statistics 2009). Most areas saw a substantial increase in unemployment, in some cases doubling. Bibb County unemployment rates went from 6.2 percent in 2001 to 10.7 percent in 2010. At 7.0 percent, unemployment rates were the lowest in Shelby County in 2010, but that was still an increase of 4.3 since 2001 (Table 15).

As expected, poverty rates generally increased as a result of the rising unemployment figures during the recession. Table 14 shows the percent of people below the poverty line in 2001 and 2010. The Bibb County unemployment rate was 12.6 percent in 2010, significantly lower than the state average. This county was unusual in that the poverty rate declined between 2001 and 2010, as it did for Hale and Perry counties. However, poverty rates remained higher than average in these counties in 2010.

**Table 12. 2001 percent employment by industry for counties in the study area and the State of Alabama**

Industry	Bibb	Chilton	Hale	Jefferson	Perry	Shelby	Tuscaloosa	Alabama
Natural Resources and Mining	8	4	5	1	6	1	3	1
Construction	6	8	3	6	2	10	7	6
Manufacturing	22	15	32	10	24	17	16	18
Trade, Transportation, and Utilities	29	27	14	26	16	23	18	21
Information	1	1	1	4	ND	2	2	2
Financial Activities	5	5	3	10	3	5	4	5
Professional and Business Services	3	2	2	15	1	12	6	10
Education and Health Services	8	18	27	10	37	15	28	19
Leisure and Hospitality	6	10	2	9	6	9	10	8
Other Services	4	3	2	4	ND	3	3	3
Public Administration	7	7	8	5	4	4	4	6

ND – no data

Source: U.S. Bureau of Labor Statistics 2012

**Table 13. 2010 percent employment by industry for counties in the study area and the State of Alabama**

Industry	Bibb	Chilton	Hale	Jefferson	Perry	Shelby	Tuscaloosa	Alabama
Natural Resources and Mining	4	3	8	1	4	1	3	1
Construction	19	6	5	5	2	6	5	5
Manufacturing	13	16	21	8	20	7	14	13
Trade, Transportation, and Utilities	26	26	15	25	14	24	17	21
Information	1	1	1	3	ND	1	1	1
Financial Activities	4	4	3	9	4	11	4	5
Professional and Business Services	3	3	2	15	5	15	8	12
Education and Health Services	12	22	30	12	44	17	30	22
Leisure and Hospitality	8	9	5	11	4	11	11	10
Other Services	3	2	1	4	ND	3	2	3
Public Administration	7	8	10	7	4	4	4	7

ND – no data

Source: U.S. Bureau of Labor Statistics 2012

**Table 14. Income, unemployment, and poverty estimates**

Demographic Unit	Average Annual Income		Percent Unemployment		Percent of Persons below Poverty Line	
	2001	2010	2001	2010	2000	2010
United States	\$36,214	\$41,673	4.7	9.6	12.4	14.3
Alabama	\$30,102	\$40,289	4.7	9.5	16.1	17.1
Bibb County	\$23,108	\$33,123	6.2	10.7	20.6	12.6
Chilton County	\$22,481	\$30,017	6.6	12.1	15.7	18.4
Hale County	\$21,657	\$30,746	5.3	12.8	26.9	24.6
Jefferson County	\$35,453	\$46,724	3.9	9.4	14.8	15.5
Perry County	\$20,581	\$29,250	10.1	16.3	35.4	28.8
Shelby County	\$32,158	\$42,771	2.7	7.0	6.3	7.4
Tuscaloosa County	\$29,972	\$40,198	3.8	8.3	17.0	19.7

Source: U.S. Bureau of Labor Statistics 2012a and 2012b, U.S. Census Bureau 2000 and 2012

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## LAND USE PATTERNS

### **Prehistoric Land Use (Native American to 1814)**

The refuge is located within lands formerly part of the Creek Indian Nation. While the Creeks primarily settled along the Coosa and Tallapoosa rivers to the east, scattered communities existed along the Cahaba, remote from the center of Creek culture. Because Choctaw lands were located a short distance west of the Cahaba River, permanent Creek settlements tended to exist along the east bank of the Cahaba, or to the east. Lands west of the river provided a buffer between the two tribes and were primarily used for hunting. Typically, Native Americans cleared small openings in the woodlands to cultivate crops in and around village sites (Ellison 1984).

The Treaty of Fort Jackson in 1814 forced the cessation of all Creek lands west of the Coosa, and required Indians inhabiting the region to move east of the Coosa River.

### **Historical Land Use (1814-Present)**

Following the Treaty of Fort Jackson in 1814, American settlers began moving into the area, first using the small agricultural clearings of the recently departed Creeks. Cahaba County was established in 1818 and later renamed Bibb County in 1820. Early settlement in northern Bibb County during the 1820s occurred along Caffee Creek west of the refuge and along the Little Cahaba River and Mahan Creek to the southeast. Throughout the 19th Century, most inhabitants of the area lived on small, isolated farms seldom traveling outside the county.

By the 1830s, small ironworks were established across the county, with some of the larger along the Little Cahaba River and Mahan Creek east of the refuge. The Civil War further stimulated the development of ironworks across the county. The largest of these iron furnaces was the Brierfield Iron Works along Mahan Creek southeast of the refuge. Following the war, the county's furnaces were increasingly in competition with the larger Birmingham coke-fueled plants. By the early 1890s, the iron industry had all but disappeared from the county.

Coal mining was another industry stimulated by the Civil War. During the war, the Thompsons mined coal for the Confederate government using slave labor. The coal seam mined by the Thompsons is within refuge boundaries and was eventually developed as the Piper mines in later years. By the 1880s prospectors had come to northern Bibb County searching for coal to fuel the burgeoning iron and steel mills in the new city of Birmingham. The town of Blocton soon became the center of mining across northern Bibb County. By 1890, seven mines and a coke oven operated in the Blocton area. In all probability, local forests supplied support timbers for the numerous mines in the area. Both Mohr (1901) and Harper (1942) comment that significant quantities of local timber went into mining the Cahaba coal fields. Mohr (1901) estimates that half a cubic foot of timber was required to mine every ton of coal. Two of the most prosperous communities were the twin towns of Piper and Coleanor. The towns were established in 1901 along the northeastern edge of the refuge. Piper mines and a portion of the town-site were within current refuge boundaries. The two towns eventually reached a population of 2,500, including 500 mine employees. Today, the mines are abandoned and the town site has disappeared.

Only the vestiges of former mining remain within the refuge. All represent safety and/or environmental issues for natural communities and visitors to the refuge. Three abandoned underground mines, dating from 1900 to 1930, historically existed within the refuge. Between 1930 and 1960, and again in the 1980s, further attempts were made to surface mine the coal seam. Today, the refuge still contains remnants of these strip mining activities, which include a highwall spoil

mound measuring almost 4,000 feet long and 80 feet high, two ponds, an abandoned coal tipple, and sediment basin (Alabama Department of Industrial Relations 2008).

The lumber industry in northern Bibb County was stimulated by the coming of the Alabama and Chattanooga Railroad, later to become the Southern Railway. By the 1870s, several sawmills were in operation in northern Bibb County. One of the larger timber operators in Bibb County was W.E. Belcher. Belcher constructed his first sawmill during the timber boom in 1906. By 1918 he was operating four sawmills in the local area (Ellison 1984). The only remaining second-growth longleaf forests on the refuge were part of the former Belcher holdings. In recent years, most of the refuge was owned by industrial timber companies that established extensive loblolly pine plantations.

### Current Land Use

The seven-county area encompasses almost 4 million acres. In all counties, deciduous, mixed, and evergreen forests are the dominant land cover, typically occupying over 40 percent, combined. Compared to the other counties in the study area, Bibb has the most forest cover; with over 70 percent in some type of tree cover (Table 15 and Figure 9). Hale County has the highest percentage of agricultural land with almost a quarter under some type of production, while Bibb and Tuscaloosa counties the lowest, at approximately 6 percent. Jefferson County has more of its area developed (about 27 percent) than any of the other counties in the area. Bibb, Hale, and Perry counties have the lowest levels of developed land.

Since 1992, land use has changed substantially in Bibb County. Croplands declined by almost 80 percent between 1992 and 2006; much of this the result of small farms going out of business. Wetlands, although a relatively small component of the landscape, also declined markedly. Mixed forest covered 125,591 acres in 1992. This declined to 57,543 acres by 2006, a decrease of over 50 percent (Table 15). Much of this decline can be attributed to conversion to successional habitats (e.g., clear-cuts growing back, abandoned farmland) and developed land. Although Bibb County is largely rural, developed lands increased over 600 percent from 1992 (2,151 acres) to 2006 (15,379 acres). As Bibb County's population continues to grow, conversion of forests and other natural lands is anticipated.

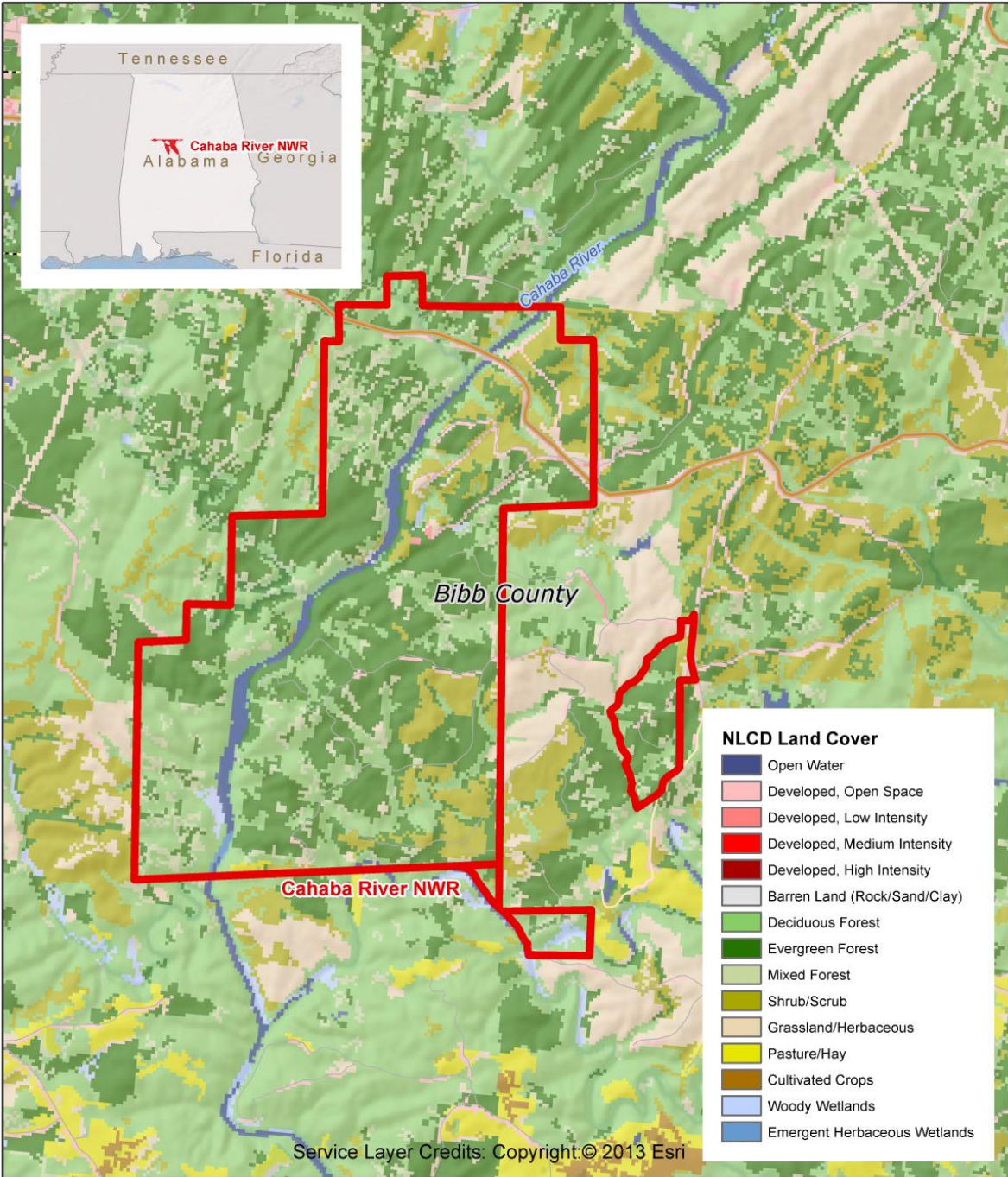
**Table 15. Land use change in Bibb County, Alabama**

Land Cover	1992	2006	Percent Change
<b>Mixed Forest</b>	125,591	57,543	-54
<b>Evergreen Forest</b>	114,046	119,954	5
<b>Deciduous Forest</b>	97,461	111,027	14
<b>Woody Wetlands</b>	19,512	16,727	-14
<b>Pasture/Hay</b>	17,500	21,678	24

<b>Land Cover</b>	<b>1992</b>	<b>2006</b>	<b>Percent Change</b>
<b>Cultivated Crops</b>	11,313	2,499	-78
<b>Successional<sup>1</sup></b>	10,593	52,166	392
<b>Developed</b>	2,151	15,379	615
<b>Open Water</b>	1,803	2,819	56
<b>Emergent Herbaceous Wetlands</b>	403	138	-66
<b>Barren Land (Rock/Sand/Clay)</b>	370	844	128
<b>Total</b>	<b>400,744</b>	<b>400,774</b>	

<sup>1</sup>Includes scrub/shrub

**Figure 9. Land cover/use in the vicinity of Cahaba River NWR**



Produced for the Division of Planning  
 Current to October 2013  
 Basemap: ArcGIS Online 2013  
 Land Cover: NLCD, 2006



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## Regional Conservation Lands

Cahaba River NWR is part of a network of federal, state, and private conservation lands (Figure 10). It lies adjacent to the Cahaba River WMA, a 27,894-acre tract that protects a portion of the Cahaba River. Over 10 other WMAs are located within a 50-mile radius of the refuge. Other nearby refuges include Choctaw, Mountain Longleaf, and Wheeler. Two national forests, William B. Bankhead and Talladega, are also within approximately 100 miles of the refuge. Additional lands are protected through The Nature Conservancy, Alabama Land Trust, and other organizations. Although these lands protect a variety of watersheds, habitats, and wildlife, vast areas of Alabama are not set aside for conservation and natural resource-oriented recreation.

Alabama covers about 33,550,720 acres, of which approximately 1,451,621 acres, or 4.47 percent, are publicly protected (WMAs, refuges, national forests, etc.). Alabama currently protects a smaller percentage of public land than any other southeastern state. In the southeast, most states have at least 6 percent protected, and Florida has the highest percentage (21 percent) set aside for conservation (ADCNR 2009).

### RECREATION AND TOURISM

The fish and wildlife of Alabama are economically important (Table 17). According to the report, *Banking on Nature 2013: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation*, approximately 46.5 million people visited national wildlife refuges in Fiscal Year 2011, generating almost \$2.4 billion in total economic activity and creating almost 35,000 private sector jobs, producing about \$732.7 million in employment income (Carver and Caudill 2013). Additionally, recreational spending on national wildlife refuges rose to \$342.9 million in 2011 tax revenue from 185.3 million in 2006 tax revenue at the local, county, state, and federal levels (Carver and Caudill 2013).

In 2006, 87 million people, 16 years and older, fished (30 million), hunted (12.5 million), or observed wildlife (71 million), generating \$120 billion (U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, U.S. Census Bureau 2006). 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.

Tourism is an important part of Alabama's economy, contributing \$11 billion in revenue in 2013 and 8.6 percent of all non-agricultural jobs. It is estimated that over 23.5 million people visited Alabama during 2013 (Alabama Bureau of Tourism and Travel 2013). The Alabama Bureau of Tourism and Travel and many other public and private agencies promote the state's attractions.

The "Cahaba Blueway," is a comprehensive canoe trail running through central Alabama. This trail strives to increase education, recreation, economic opportunity, and visibility of the Cahaba River. The Blueway will promote outdoor recreational opportunities on the river, while linking greenways, parks, preserves, and historic sites in the central Alabama region. The Blueway is the result of a partnership between the Cahaba River Society, Alabama Innovative Engine and the Nature Conservancy in Alabama. In cooperation with a team of graphic design majors from the University of Alabama at Birmingham plans are to produce a logo, website, mobile app, and signage along the river. Currently, a book and video have been produced highlighting the beauty and importance of the Cahaba River and upcoming Blueway.



**Figure 10. Conservation lands in the vicinity of Cahaba River NWR**

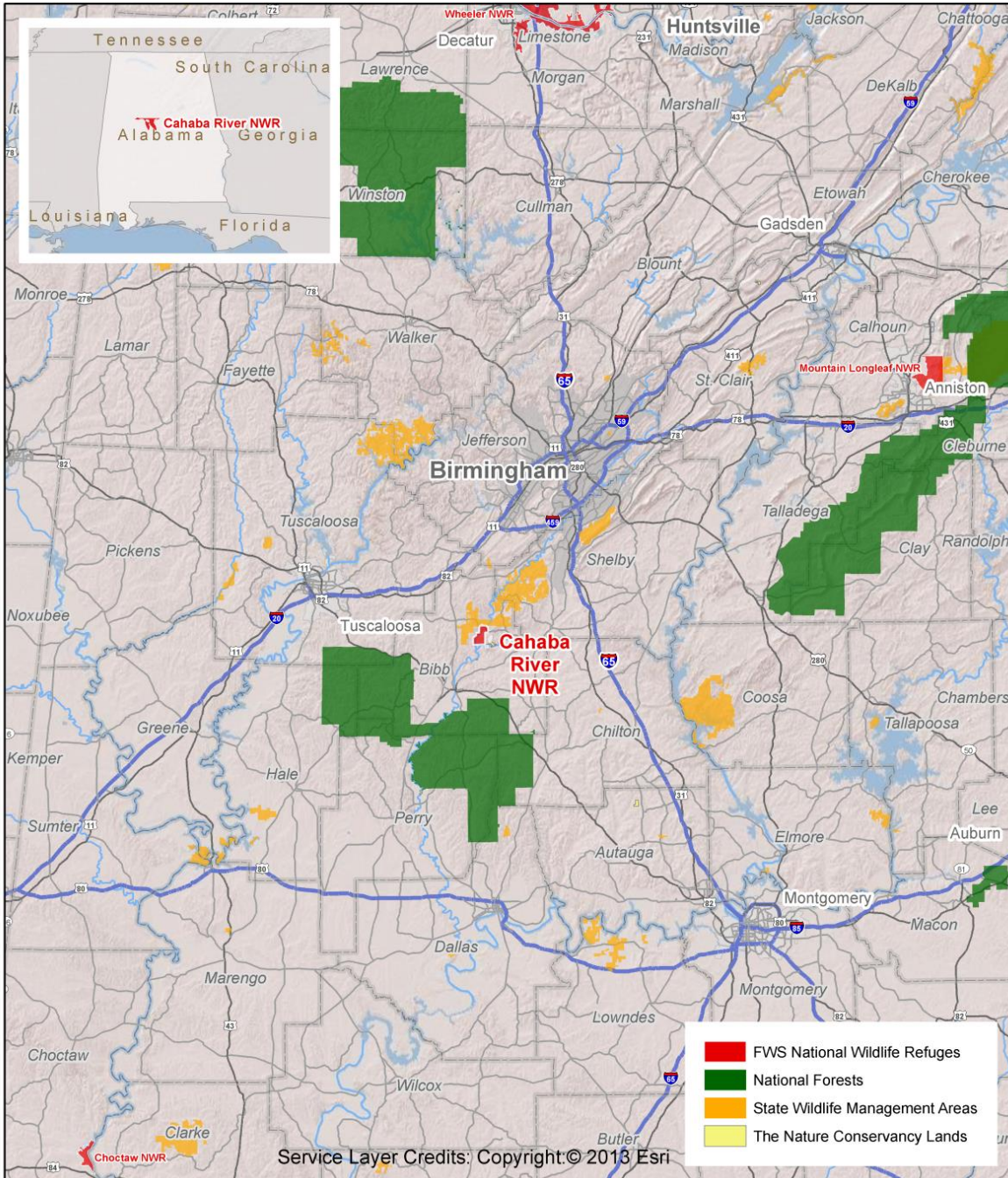


U.S. Fish & Wildlife Service

**Cahaba River National Wildlife Refuge**

Bibb County, Alabama

*Area Conservation Lands*



Produced for the Division of Planning  
Current to October 2013  
Basemap: ArcGIS Online 2013



## WILDLIFE-DEPENDENT RECREATION IN ALABAMA

Wildlife-dependent recreation is an important component of the manner in which people in Alabama spend their leisure time. Wildlife-dependent recreation includes hunting, fishing, and wildlife-watching. In 2011, over 1.7 million people participated in wildlife-related recreation in the State of Alabama, generating \$2.7 billion to the state's economy. Of these hunting expenditures were the highest at \$913 million, followed by wildlife observation and fishing respectively (Table 16).

**Table 16. Wildlife-dependent recreation in Alabama during 2011**

Activity	Number of Participants	Expenditures			
		Trip-related	Equipment and Supplies	Other Items*	Total
Hunting	535,000	\$405,000,000	\$357,000,000	\$151,000,000	\$913,000,000
Wildlife Watching	1,100,000	\$41,000,000	\$668,000,000	\$25,000,000	\$734,000,000
Fishing	683,000	\$317,000,000	\$128,000,000	\$12,000,000	\$456,000,000
<b>Totals</b>		<b>\$763,000,000</b>	<b>\$1,153,000,000</b>	<b>\$188,000,000</b>	<b>2,103,000,000</b>

*\*(Other items include magazine subscriptions, membership dues and licenses.)*

*Source: U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2011*

### HUNTING

The variety of upland and wetland habitat found in the Study Area support a diversity of game species, including deer, wild hog, turkey, waterfowl, dove, quail, and a variety of small game. Many of these species attract sport and game enthusiasts to the area. Several of the game species hunted in the Study Area are further discussed below. The ADCNR WMA systems have been highly instrumental in providing quality hunting opportunities to Alabama. Alabama's first WMA was established in the 1940s, and today there are 37 WMAs across the state containing over 756,000 acres. WMAs are operated by the Alabama Division of Wildlife and Freshwater Fisheries (ADWFF), and provide valuable public access for hunting and a multitude of other recreational activities. Hunting, fishing, camping, and other permitted uses vary from area to area.

Harvest data are not available for the refuge. Area harvest data are from Cahaba River WMA. This 27,894-acre WMA was established in 2009 and lies adjacent to the refuge. Hunting is permitted on 70 percent of the WMA. Game harvest data for this WMA are shown in Table 17. Hunter success data for big game harvested in the Cahaba River WMA are shown in Table 18.

**Table 17. Game harvest data for Cahaba River WMA between 2006 and 2011**

Game Species	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Deer	182	205	194	232	193
Turkey	50	43	14	12	32
Feral Swine	ND	ND	ND	0	10
Squirrel	1,000	900	800	850	1,000
Quail	100	75	ND	30	25
Rabbit	500	450	500	550	300
Dove	400	350	500	1,800	2,000
Waterfowl	20	40	35	40	35
Raccoon	100	100	90	80	200
Opossum	20	5	5	5	10
Woodcock	2	2	2	5	2
Snipe	2	2	2	ND	ND
Fox	ND	ND	ND	ND	ND

ND – no data  
Source: ADWFF 2012

**Table 18. Hunter success on Cahaba River WMA between 2006 and 2011**

Game Species	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Deer*	5.1%	5.1%	4.7%	4.8%	4.1%
Turkey**	12.5%	9.3%	3.5%	3.4%	4.9%

Hunter success is defined here as the percentage of the number of animals taken with respect to the number of man-days hunted.  
\*youth, stalk, and dog gun hunts only (does not include archery, primitive weapons, etc.)  
\*\*adult turkey hunts only  
Source: ADWFF 2012

**Deer**

White-tailed deer are the most popular game animal in Alabama, and based on surveys collected in 2006 approximately 615,000 hunters (or 85 percent of all hunters) targeted this species (USFWS and U.S. Census Bureau 2006). Deer were rare in most of Alabama until recent years. In the early 1900s, it was estimated only about 2,000 deer existed in the entire state. After decades of restocking and management efforts, Alabama’s deer population was estimated at 1.75 million animals in 2000. Alabama utilizes quality deer management, the voluntary use of restraint in the harvesting of young bucks combined with an appropriate antlerless deer harvest to maintain a healthy deer population in balance with the habitat. In spite of this, many areas in Alabama have deer populations that are considered higher than optimal. As a result, over-browsing of native vegetation, crop damage, and deer/vehicle collisions have become more common (Cook and Gray 2003).

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### ***Feral Swine***

Feral swine or hog populations have increased dramatically in Alabama since the 1980s. Before that time, this species was located mostly in south Alabama with highest numbers found along the lower Tombigbee and Alabama rivers. Hogs have spread to northern portions of the state primarily as a result of individuals illegally relocating feral hogs into new areas. The human relocation of hogs has resulted in feral hogs on many of Alabama's WMAs. Most WMAs have wild hogs, which can be taken during any scheduled hunt with any weapon legal for that type hunt (Carver 2011).

### ***Wild Turkey***

Wild turkey is a highly popular game bird in Alabama. Uncontrolled hunting and habitat loss, combined with several years of extreme weather during the poult rearing season resulted in the near-extirpation of the species in Alabama. In the early 1940s, restocking efforts were initiated to re-establish turkey populations in counties where they were absent. ADWFF still oversees a restocking program. Through February 2006, a total of 1,936 wild turkeys have been trapped at the Fred T. Stimpson and Upper State Wildlife Sanctuaries in Clarke County and restocked in 46 Alabama counties. Due to the success of the restocking program and other conservation measures, few stockings are underway currently, since most of the suitable range in Alabama is already occupied by wild turkeys. In 2007, the estimated Eastern wild turkey population in Alabama was approximately 500,000 birds. Turkey densities vary across the state and are primarily a function of habitat quality. Within the study area, turkey densities range between 6 and 25 birds per square mile. The recovery of wild turkey populations in Alabama has allowed for a successful hunting program. Results from surveys show that during the 2006-2007 seasons, about 58,000 hunters (near 495,000 man-days) harvested approximately 72,000 wild turkeys in Alabama (Barnett and Barnett 2008).

### ***Waterfowl***

Waterfowl comprise an important part of migratory birds hunted in the U.S., and according to national survey data, approximately 1.8 million hunters targeted ducks and geese in 2006 (USFWS and U.S. Census Bureau 2006).

### ***Quail***

Northern bobwhite quail populations are declining in Alabama, largely a result of changes in land use that cause declines in available habitat. This is a trend mirrored across the eastern U.S. Quail utilize open, successional habitats, which are typically not found on intensively managed, highly mechanized farms that dominate the landscape. Breeding bird survey data documents a 4 percent per year decline in bobwhite abundance in Alabama since the 1960s, and an accelerated 9 percent per year decline in the mid-1980s to mid-1990s. In 2004, Alabama's quail population was less than 20 percent of what it was when surveys began in 1966 (Stewart 2005).

### ***Dove***

The mourning dove is the leading migratory game bird in the U.S. and more doves are harvested annually in the U.S. than all other migratory game birds combined (Dolton et al. 2007). In 2013, over 14.5 million doves were harvested in the U.S., by approximately 830,000 hunters (Seamans et al. 2014).

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### **Other Small Game**

In addition to quail and dove, other small game hunted in Alabama include snipe, woodcock, rabbit, opossum, raccoon, fox, and squirrel. Of these, squirrel are among the most targeted, with over 86,000 hunters seeking this species in Alabama during 2006 (USFWS and U.S. Census Bureau 2006).

### **FISHING**

The vast and varied water resources of Alabama provide numerous opportunities for saltwater and freshwater fishing. Alabama contains over 500,000 acres of ponds, reservoirs, and a few lakes, and over 77,000 miles of rivers and streams. According to a 2006 survey, over 800,000 resident and visiting freshwater anglers fished inland waters in Alabama. Major species fished include crappie, sunfish, white/striped bass, black bass, and various catfish (USFWS and U.S. Census Bureau 2006).

### **WILDLIFE VIEWING**

Wildlife viewing includes a variety of non-consumptive activities such as observing and photographing wildlife. This component of wildlife-dependent recreation has increased dramatically, with the number of participants increasing from 450,000 in 1991 to over 734 million in 2011 (USFWS and U.S. Census 1991 and 2006).

## **REFUGE ADMINISTRATION AND MANAGEMENT**

### **LAND PROTECTION AND CONSERVATION**

Since its establishment in 2002, Cahaba River NWR has acquired approximately 3,681 acres, or approximately 47 percent of the 7,784-acre approved acquisition boundary. Once acquired, these lands are protected from urban development, commercial forestry, intensive row-crop agriculture, mining, and other land uses that are generally not considered compatible with the Refuge System's conservation mission. Table 19 shows the refuge's acquisition history to date.

**Table 19. Cahaba River NWR acquisition history (2002 – 2011)**

<b>Year Acquired</b>	<b>Acreage</b>
<b>2002</b>	304
<b>2002</b>	816
<b>2002</b>	165
<b>2003</b>	116
<b>2003</b>	304
<b>2003</b>	1,272
<b>2004</b>	60
<b>2004</b>	46
<b>2005</b>	331
<b>2007</b>	168

<b>Year Acquired</b>	<b>Acreage</b>
<b>2009</b>	26
<b>2011</b>	20
<b>2011</b>	53
<b>Total</b>	<b>3,681</b>

In 2010, the Service proposed a major expansion of Cahaba River NWR. As part of that proposal, the new acquisition boundary would have been increased to 106,415 acres. In addition, a Cahaba River Conservation Area of 173,380 acres was proposed. In May 2011, the Service tabled the decision on the expansion proposal, based on public input (USFWS 2011b).

### *MINING RECLAMATION*

Surface mining is a broad category of mining in which soil and rock overlying the mineral deposit (the overburden) is removed. It is the opposite of underground mining, in which the overlying rock is left in place, and the mineral removed through shafts or tunnels. Surface mining is now the predominant form of mining in coal beds such as those in Appalachia and America's Midwest.

Highwall mining is another form of surface mining that originated from auger mining. The method differs in that continuous miners, rather than augers, are used to bore an entry adjacent to the coal seam of a highwall left behind in an open pit mine after excavation has been completed. Screw conveyors positioned behind the continuous miner haul the cut coal from deep within the seam up to an outside stockpiling area where it is then transported away. Very little soil is displaced in contrast with mountain top removal; however, a large amount of capital is required to operate and own a highwall miner.

The Service working with the Alabama Department of Industrial Relations (ADIR) Mining and Reclamation Division will eliminate serious hazards to public health and safety in the form of a dangerous highwall on the refuge. The Piper II Abandoned Mine Lands Project (Piper II Project) will reclaim a portion of a highwall which averages approximately 80 feet in height and extends a linear distance of 3,750 feet. The highwall was left unreclaimed during past surface coal mining operations. Due to the overall cost (estimated at \$2.6 million), the project is being conducted in phases. Reclamation of the mined area is expected to reduce the potential for transport of sediment and coal-related contaminants to the Cahaba River and is expected to have a long-term beneficial effect.

### *VISITOR SERVICES*

#### **Wildlife Observation and Photography**

Wildlife observation and photography opportunities are provided on the refuge by several roads and trails. The primary road open to the public is River Trace Road, which offers access to numerous river overlook points. There are several unmarked trails and two marked trails on the refuge. Pipers trail is marked with two observation decks that provide overviews of the Cahaba River. The other marked trail is unnamed, but forms a loop along river trace road. Combined, they total over six miles of trails through a variety of landscapes and habitats (Figure 12). There are no photo blinds or observation towers on the refuge.

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## **Hunting**

A variety of large and small game hunting opportunities are provided on the refuge. In 2007, the Service completed a sport hunting package for the refuge, to help guide future hunting. Hunting regulations on the refuge generally follow those published seasonally for the state-operated Cahaba River WMA. However, certain additional restrictions are imposed. These include, but are not limited to, archery-only deer hunting; hunting of woodcock, dove, waterfowl, and crow is prohibited; and no trapping is allowed.

## **Fishing**

The refuge primarily offers access to fishing and does not manage this activity directly, as it does not have jurisdiction over state navigable waters, which includes the Cahaba River. Anglers use the refuge for bank fishing and to access the river. Fishing regulations are in compliance with those published seasonally for the state. Species sought in the Cahaba River include black bass, various sunfish species, and catfish.

## **Environmental Education and Interpretation**

Environmental education provided by the refuge consists primarily of its involvement with the state's Forestry Awareness Week Now (FAWN). FAWN was established several years ago by the Alabama Forestry Commission and teaches sixth graders about natural resource and environmental issues while visiting forests around the state. The refuge is one of FAWN's stations, and teaches children about the importance of forests as wildlife habitat. Messages included in the lectures are the role of forest succession and management in providing habitat for a diversity of species.

Opportunities for interpretation are provided by several kiosks and way signs along refuge trails and roads. Currently, there are four kiosks along Piper Trail that focus on topics such as the Piper mine, the Refuge System, and the role of the refuge. Additional kiosks in development will include messages relating to the history of the Piper, mussels, and Cahaba lily. At the beginning of River Trace Road are two way signs, which provide information about herps and birds.

## *PERSONNEL, FACILITIES, OPERATIONS, AND MAINTENANCE*

Cahaba River NWR is part of the Wheeler NWR Complex, which includes Wheeler, Key Cave, Sauta Cave, Fern Cave, Mountain Longleaf, and Watercress Darter refuges. Cahaba River NWR is co-managed with Mountain Longleaf NWR, located in Anniston, Alabama. The refuge currently has two designated staff positions. The refuge manager is stationed in Anniston, and the assistant refuge manager position is vacant. A zone officer periodically conducts patrols and responds to issues as needed. The current organizational chart for the refuge is shown in Figure 13.



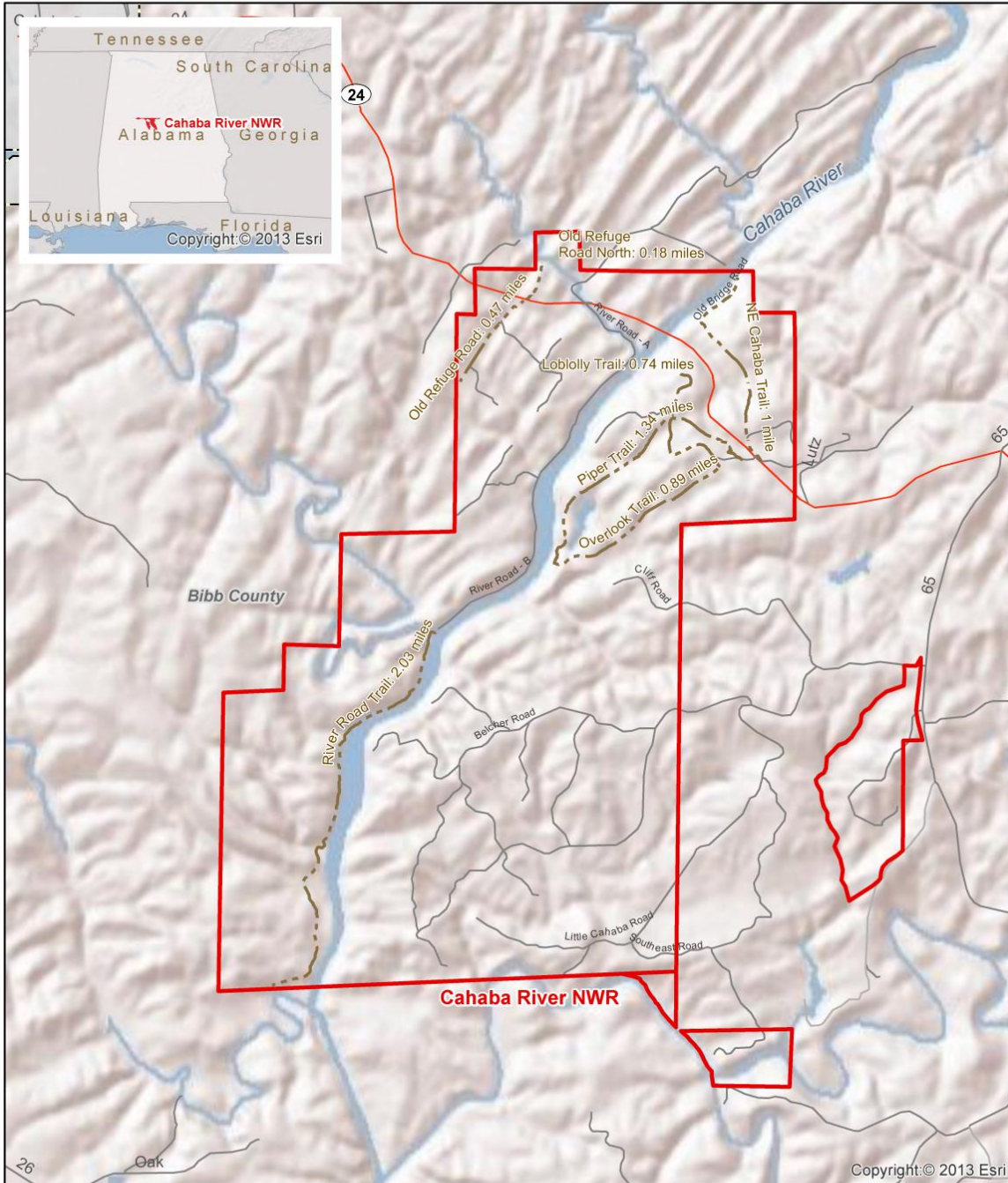
**Figure 11. Refuge trails**



U.S. Fish & Wildlife Service

**Cahaba River National Wildlife Refuge**  
Bibb County, Alabama

Visitor Services



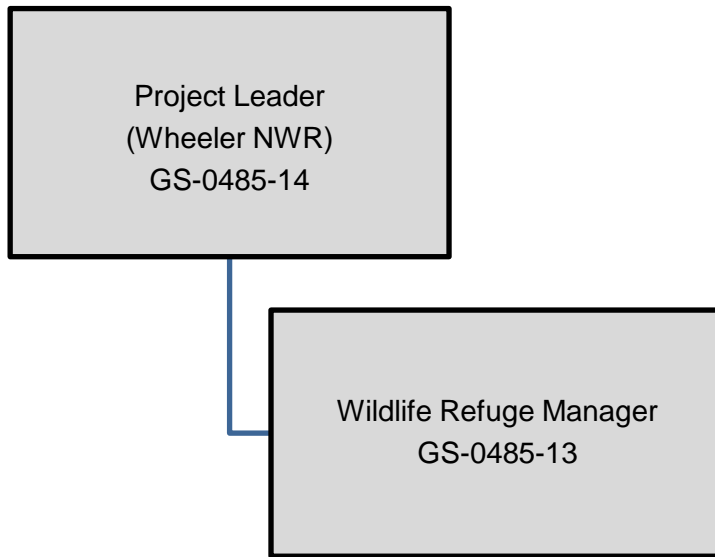
Produced for the Division of Planning  
Current to October 2013  
Basemap: ArcGIS Online 2013





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**Figure 12. Cahaba River NWR current organizational chart**



Currently, there are no facilities at the refuge. Staff is located either at Mountain Longleaf office in Anniston or Wheeler NWR Complex in Decatur, Alabama. Infrastructure on the refuge consists of roads, trails, parking areas, signs, overlooks and kiosks.

Refuge personnel from Mountain Longleaf and Wheeler NWRs maintain roads and trails for the public and refuge vehicles. Repairs to gates, kiosks, and other infrastructure are conducted as needed. The Friends Group organizes and conducts trash pick-ups along refuge roads and County Road 24.

#### *BUDGET*

Cahaba River NWR does not have its own specific budget. Funding received by Mountain Longleaf NWR is allocated approximately 45 percent for Mountain Longleaf NWR, 45 percent for Cahaba River NWR, and 10 percent for Watercress Darter NWR. In Fiscal Year 2014, funding for the three refuges was approximately \$158,825, compared to \$437,000 in Fiscal Year 2010, a decrease of more than 64 percent. Table 21 shows estimated refuge funding. Approximately \$71,000 is allocated to the refuge in Fiscal Year 2014. The majority of this was spent on operations and visitor services.

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**Table 20. Cahaba River NWR funding for Fiscal Year 2014**

<b>Category</b>	<b>Amount</b>
Operations (salaries, facilities costs) 54%	\$38,340
Maintenance (materials, fuel, wage-grade salaries) 14%	\$9,940
Visitor Services (salaries, new trails, kiosks, etc.) 32%	\$22,720
<b>Total</b>	<b>\$71,000</b>

The Friends of the Cahaba River National Wildlife Refuge was organized in 2002 to provide support for the refuge. The Friends Group is involved with a variety of events, such as Renew Our Rivers cleanups, Lily Day, and Boy Scouts of America Eagle projects.

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## III. Plan Development

### OVERVIEW

Although Cahaba River NWR has several step-down management plans (e.g., Habitat Management Plan and Sport Hunting Plan), no comprehensive plan exists to address all refuge programs. The comprehensive conservation planning process allows the Service, governmental and non-governmental partners, and the public the opportunity to take a detailed look at refuge programs, resources, and management. This process provides for public involvement in developing a plan for future actions. These plans are revised every 15 years or earlier, if monitoring and evaluations determine that significant changes are needed to achieve the refuge's purposes, vision, goals, and/or objectives. The basic steps of the planning process involve the gathering of information, scoping for public input, developing a draft plan, gathering public input on the draft plan, developing a final plan, and implementing and monitoring the actions identified in the final plan.

### PUBLIC INVOLVEMENT AND THE PLANNING PROCESS

The planning process began with pre-planning activities in October 2011, with various data-gathering sessions. As part of that process, the Service reviewed approved step-down plans, a visitor services review, GIS data, species' lists, and other information pertinent to the development of a comprehensive conservation plan.

An intergovernmental informational meeting was held on May 8, 2012, at Tannehill Ironworks State Park. In addition to various Tribes, several federal, state, and local agencies were invited. A total of 13 people, including Service staff, participated.

On February 26, 2013, a public scoping meeting was held at the Cahaba Lily Center in West Blocton. The meeting was announced via several local media outlets, the refuge website, and social media site. Approximately 10 people attended.

### SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

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

#### *FISH AND WILDLIFE POPULATION MANAGEMENT*

**Baseline Data:** The absence of baseline data is an issue of concern. Consequences of active or inactive management are minimally understood. Past refuge research/studies/surveys consist of an EPI biological and water quality study (2002), freshwater mussel survey (2004), aquatics

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survey (2005), coal waste hazard characterization (2005), rare plant survey (2007), bat surveys (2009 - 2010), Breeding bird Point Count (2009, 2013), butterfly survey (2009), USDA Forest Service water quality monitoring (2009), amphibian and reptile survey (2010), moth survey (2010), nightjar survey (2010), refuge water quality monitoring (2012 – present), Cahaba River BioBlitz (2013), Contaminant Assessment Process (2013), and Water Resource and Inventory Assessment (2014). Copies of reports generated from these activities were available during the biological review and currently available at the refuge office.

Threatened and Endangered Species: Cahaba River NWR is located within the historic ranges of the Indiana bat (*Myotis sodalis*), the gray bat (*Myotis grisescens*), Cahaba shiner (*Notropis cahabae*), Blue shiner (*Cyprinella caerulea*), Goldline darter (*Percina aurolineata*), Fine-lined Pocketbook (*Lampsilis altilis*), Triangular Kidneyshell (*Ptychobranthus greeni*), Round Rocksnail (*Leptoxis ampla*), Flat Pebblesnail (*Lepyrium showalteri*), Cylindrical Lioplax (*Lioplax cyclostomaformis*), and Georgia rockcress (*Arabis georgiana*), all listed by the Service as threatened, endangered, or as a candidate species. Transient species include the American bald eagle (*Haliaeetus leucocephalus*), which was delisted in 2007, but is still protected under the provisions of the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act.

Refuge habitats may incur some summer use by Indiana bats. Although surveys have been conducted, no data exist to make this determination. A much greater monitoring effort would be needed to verify the presence of species with smaller represented populations, restricted habitat use, and those with seasonal occurrences.

No other threatened and endangered species are known to occur on the refuge; however, refuge specific survey data are minimal. Other priority surveys continue to be identified to ensure that appropriate management actions are included in long-term planning efforts.

#### Interagency Comments:

- Monitoring of threatened and endangered species is needed

#### Public Comments:

- Refuge habitat should be assessed for possible reintroduction of threatened and endangered mussels and snails.

#### *HABITAT MANAGEMENT*

Refuge forests consist of pine plantations, hardwood and hardwood-mixed pine, natural and restored longleaf pine, and aquatic (river) environments. Tracts formerly in private individual ownership are in the best ecological condition. Although fire suppressed, these lands contain remnants of the original forest that covered the region. Approximately 60 percent of the refuge is currently pine plantations and presents the best opportunities for longleaf pine restoration. Natural community mapping and characterization of the refuge was conducted in 2007 by the Alabama Natural Heritage Program. A forest inventory and management plan is needed to properly guide management actions in order to most appropriately achieve the goals and objectives of the refuge and support regional and national plans. The management plan will need to address forest plantations, hardwood-mixed pine and existing longleaf pine stands, and the use of fire and restoration.

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The benefit of prescribed fire is substantial in that it reduces fuel loads, lessens wildfire threats, and is necessary to maintain the longleaf pine ecosystem. However, as land-use patterns change, consideration for both prescribed fire smoke and wildfire smoke management becomes a greater concern. Aesthetic quality and smoke exposure for local residents and visitors is a concern to be proactively addressed prior to any prescribed fire being applied to the refuge.

Interagency Comments:

- An updated Habitat Management Plan is needed with longleaf restoration as a priority
- Fire management, including wildfire and smoke management
- Invasive organisms are a problem on the refuge
- Taro or coco yam (*Colocasia esculenta*) is expanding and has the potential to smother native streamside vegetation

Public Comments: None

### *RESOURCE PROTECTION*

The refuge and its programs have grown since the refuge was established. This growth can be attributed to congressional, state, and community support that has, and continues to exist, for the Cahaba River NWR. Management activities are followed closely by refuge supporters to ensure that growth and positive direction are sustained. These relationships have been, and will continue to be, important in maintaining the principles on which the refuge was established. Awareness of the refuge's presence is constantly increasing with hopes that through an environmental education program, the Cahaba River Blueway and better employee visibility, it will continue to rise. Resource protection issues include acquiring land within the approved acquisition boundary, protecting existing longleaf habitat while improving connectivity through private lands and partners, and maintaining/improving water quality.

Landowners' and corporations' tracts of land vary in size within the acquisition boundary (26 -1,600 acres). The refuge works closely with The Nature Conservancy to identify willing landowners within the acquisition boundary to pursue land acquisitions. The refuge also partners with adjacent landowners to improve habitat through prescribed fire and longleaf pine educational opportunities. This helps the refuge meet landscape conservation goals and improves connectivity between refuge and private landowners' and partners' lands.

Water quality is an ongoing issue for the refuge and impacts throughout the basin are determined to be most likely associated with three major stressor or pollutant categories: sediment, nutrients, and toxic substances. The refuge currently participates as a stakeholder in the Alabama Clean Water Partnership aimed at educating ourselves and the public on ways to reduce nutrient and sediment input to the Cahaba River and its tributaries. Increased staff capacity would allow more time to be contributed to this partnership and public education regarding impacts to the Cahaba River and associated watersheds.

Interagency Comments:

- The Service should more actively pursue buying land within the acquisition boundary from willing sellers.
- Water Quality: The refuge should work with cities upstream and non-governmental organizations to help improve water quality of the Cahaba River.

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- Longleaf habitat connectivity (through private lands and partners)

Public Comments:

- The Service should more actively pursue buying land within the acquisition boundary from willing sellers.

*VISITOR SERVICES*

The refuge's priority visitor services management issues are related to the impacts associated with limited access points to the refuge, lack of staff to properly develop and implement educational and interpretive programs, the need for greater oversight and a more frequent law enforcement presence in areas and times of year with heavy public use and the associated demand for public use activities. The Service is committed to providing appropriate, compatible, and quality public use opportunities and to increasing awareness and understanding of wildlife and habitats to limit the impacts to and disturbance of wildlife and habitat. This planning process identified the importance of addressing the increasing impacts from human activities and use (e.g., boating activities, traffic issues, wildlife disturbances, decreased water quality, erosion, trash, and illegal access).

The refuge currently has more than 30,000 annual visitors, the majority of which visit between May - August. The current population of the seven counties in and around the refuge is over one million and expected to increase. Increased traffic along River Trace Road (the main access road) is creating erosion and traffic issues, where it is too narrow for cars to safely pass in opposite directions. Parking is limited along this narrow road and visitors are damaging streamside vegetation in order to create parking spaces. The area has a history of vandalism, so no facilities exist for visitors such as restrooms or trash cans. This results in copious amounts of trash. Access to the eastern and southern portion of the refuge is another important issue for the refuge to address.

Interagency Comments:

- River Trace Road Issues: Traffic, erosion
- Manage access (Service vs. public; foot and vehicle)
- Limited access to eastern/southern portion of the refuge
- Concern regarding archery only hunting
- Concern as to why waterfowl hunting is not allowed

Public Comments:

- Organize picnics to draw visitors
- Refuge needs bathrooms
- Camping should be allowed
- Some people think the refuge is closed at night
- Refuge needs more educational programs
- Bring in speakers
- Refuge could bring more visitors that spend their money in Bibb County
- Visitors could combine their visit with West Blocton Coke Ovens Park and/or Tannehill Ironworks Historical Park
- Expand River Trace Road to create a wildlife drive
- Erosion along River Trace Road is making it too narrow and unsafe
- A segment of the public would like to see gun hunting allowed on the refuge

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- Traffic is an issue on River Trace Road, especially since there are many segments where it is too narrow for cars to safely pass in opposite directions
  - The lack of waterfowl hunting on the refuge is a concern to some members of the public
  - Areas that have heavy public use (e.g., swimming holes) need greater oversight and a more frequent law enforcement presence
  - There are locations where 4-wheel vehicles are damaging vegetation in order to park
  - Some nearby landowners are concerned about the public accessing their properties via the refuge; especially if additional parcels are acquired by the refuge in the future

### *REFUGE ADMINISTRATION*

Key issues related to refuge administration involve staffing and funding, partnership coordination, and access to refuge lands. Lack of sufficient resources to address management concerns continue to be the biggest issue for the refuge. In addition to having no onsite personnel, the complexity of refuge management and the need for the involvement of multiple partners in developing and implementing solutions, partnership coordination was identified as one of the priority issues to be addressed in the comprehensive conservation plan.

#### Interagency Comments:

- Lack of staff

#### Public Comments:

- Consider having Belcher Road going around the hill (to reduce maintenance)
- Water bars on Belcher Road are being breached because gravel is blocking them
- The lack of staff is hindering adequate refuge management
- Some roads need more gravel
- Fire/smoke management is a problem for an un-staffed refuge

### **WILDERNESS REVIEW**

Refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process. The lands within the Cahaba River NWR were reviewed for their suitability in meeting the criteria for a Wilderness Study Area, as defined by the Wilderness Act of 1964, and no areas on the refuge were found to meet those criteria. The refuge is small encompassing only 3,681 acres and is bisected by at least one paved public road and therefore has no roadless area of 5,000 contiguous acres.

The results of the wilderness review are included in Appendix H.

### **WILD AND SCENIC RIVERS REVIEW**

A wild and scenic rivers review was completed in 1979; however, the river possesses no significant river attribute to warrant designation.





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## *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. These uses are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Described below is the Draft CCP for managing the refuge over the next 15 years. This proposed management direction contains the goals, objectives, and strategies that would be used to achieve the refuge vision.

Three alternatives for managing the refuge were considered: Alternative A—No Action; Alternative B—Increased habitat and wildlife management (Proposed Action); and Alternative C—Emphasize natural and primitive processes. Each of these alternatives is described in the Alternatives section of the EA. The Service chose Alternative B as the proposed management direction.

Implementing the proposed alternative would result in healthier, more biologically diverse stands of longleaf pine forests. The refuge would increase its knowledge of refuge habitat conditions and wildlife populations. Cahaba lily stands would be less likely to be damaged by the visiting public. Water quality would improve. Public use opportunities would increase. Partnerships aimed at protecting resources and improving habitat would be strengthened.

### **VISION FOR CAHABA RIVER NWR**

Clear waters flow through shoals of blossoming Cahaba lilies, while vast stands of mountain longleaf pine cover the slopes of nearby hills. These vistas are part of the vision of Cahaba River National Wildlife Refuge, which through collaborative efforts protect aquatic and terrestrial communities to support a diversity of plants and wildlife, including a host of threatened, endangered, and imperiled species. Cahaba River National Wildlife Refuge will provide the public with a broad range of opportunities to appreciate and enjoy a biologically diverse and vanishing southern landscape.

### **GOALS, OBJECTIVES, AND STRATEGIES**

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

These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the Improvement Act, the mission of the Refuge System, and the purposes and vision of Cahaba River NWR. With adequate resources as outlined in Chapter V, the Service would strive to accomplish these goals, objectives, and strategies within the next 15 years.

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Over the course of the Service's first round of CCPs, it became apparent that our staffing and funding scenarios and thus our list of objectives and strategies did not reflect realistic changes within a 15-year time span. Too often, they reflected an ideal situation to ultimately fulfill the purpose of the refuge within that time span. To address this issue, we are using a tiered approach to strategically develop our objectives and strategies, recognizing priorities and a variety of potential accomplishment scenarios under varying funding conditions.

As we are currently facing budget reductions within the Refuge System, the need for tiering is even greater not only to reflect what each refuge is currently accomplishing and could accomplish with additional resources, but to more importantly provide realistic expectations of the accomplishments and priority decisions refuges will face as budget reductions are realized.

Tiering of objectives and strategies in CCPs is accomplished by developing a range of goals, objectives, and strategies reflecting the purpose and vision of the refuge, then strategically identifying a set of appropriate tiering criteria. Finally the priority of each objective and strategy is determined to provide placement based on each tiering scenario.

The tiering criterion is different for each refuge as it reflects reasonable projections for that particular unit based not only on purpose, vision, and biological needs, but also on potential resources (funding and personnel) over the next 15 years. By providing a range of tiering scenarios, accomplishments can better reflect the resources at hand based on the tier that most accurately displays the actual funding situation over the span of the CCP.

To provide a more realistic expectation of accomplishments over the span of the 15-year CCP, we are utilizing a tiered approach which ties plan objectives to an array of possible scenarios for resource and budget growth. The tiers are as follows:

- Tier 1: Refuge remains unfunded and the complex loses the one employee moving the refuge into "stewardship" status, managed minimally by staff from Wheeler NWR Complex.
- Tier 2: Refuge remains unfunded and all resource protection and enhancement activities are funded by the Mountain Longleaf NWR Complex budget. Staffing levels remain static at one employee for the refuge complex spending approximately 35 percent of staff time on the resource needs of Cahaba River NWR.
- Tier 3: Refuge complex funding is increased by 10 percent allowing more funding to be used toward resource, maintenance, and public use projects on Cahaba River NWR. Complex staffing levels are increased to three full-time employees spending approximately 35 percent of staff time on the resource needs of Cahaba River NWR.
- Tier 4: Refuge complex funding is increased by 20 percent allowing more funding to be used toward resource, maintenance, and public use projects on Cahaba River NWR. Complex staffing levels are increased to six full-time employees spending approximately 35 percent of staff time on the resource needs of Cahaba River NWR.

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## WILDLIFE AND HABITAT MANAGEMENT

**Goal 1:** Contribute to the conservation, enhancement, and restoration of native aquatic habitats of the Cahaba River to help maintain and assist in the recovery of federally listed species and to support native plants and animals.

### **Cahaba Lily/Water Willow Shoals**

*Objective 1.1:* Due to the fragility of Cahaba lily/water willow shoal habitat, conserve habitat by incorporating messages in signs and outreach materials, discouraging plant collection within 10 years of completing the CCP (Tier 3).

#### Discussion:

Cahaba lily/water willow shoals are vulnerable to both natural and manmade impacts. As the number of visitors increase, the intensity of disturbance to this fragile habitat is expected to increase. Educating the visiting public about the needs and requirements of this unique habitat would increase public awareness and reduce manmade impacts.

The other aspect of their vulnerability is reflected in their susceptibility to natural flooding. The plant seeds take shelter in the crevices of rocks found in swift-moving currents. As waters rise during flooding events, seeds could be washed downstream and may be unable to germinate thereby impacting the flowering population relevant to the amount of flooding in a given year.

#### Strategy:

- Place signs at strategic points along River Trace Road, emphasizing the vulnerability of the habitat based on the plant needs.

*Objective 1.2:* Within 15 years, monitor the health and distribution of Cahaba lily populations on an annual basis within the three-mile river corridor through refuge lands (Tier 2).

#### Discussion:

In order to determine if human disturbance and other biological factors are affecting the long-term viability of the Cahaba lilies, monitoring would be needed. As mentioned in Objective 1.1, flooding can negatively impact population numbers. Another biological impact is the feeding habits of convict caterpillars in the local area. However, it is unlikely that convict caterpillars alone could threaten the abundance and distribution of these plants, as there are other factors that impact them such as river sedimentation, disruptions of normal river flows, and the introduction of a rust pathogen. However, it is clear that these caterpillars are not doing the plants any favors either, as they consume flowers, stalks, and developing seeds plus reduce leaf area and diminish the amount of stored resources the plants can acquire (Van Zandt et al. 2013).

The combined impacts could dramatically affect the size and distribution of the population on an annual basis, leading to cumulative population impacts.

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**Strategies:**

- Partner with universities and/or nonprofit groups to conduct vegetation surveys.
- Partner with the state agency and the Ecological Services branch of the Service to conduct vegetation surveys.
- Design surveys so that data can be compared over time.
- Partner with universities and/or nonprofit groups to map plant densities and distribution within shoals along the river (Tier 2).

**Exotic Aquatic Plants**

*Objective 1.3:* Over the life of the CCP, control alligator weed by applying herbicide on ¼-acre annually to reduce competition with native aquatic species (Tier 3).

**Discussion:**

Alligator weed is an aggressive nonnative plant species that can change aquatic communities by displacing native species. There are approximately one to two acres of alligator weed on the refuge spread over dozens of sites. Physical controls are ineffective and there are no biological controls so chemical control is the method of choice. The most effective chemical controls are systematic herbicides.

**Strategies:**

- Within three years, map the distribution of the alligator weed.
- Research the various systematic herbicides to determine the most effective for aquatic applications.
- Apply systematic herbicide of choice accordingly to achieve maximum control on ¼-acre annually.

**Goal 2:** Conserve, enhance, and restore native terrestrial habitats of the refuge to maintain and assist in the recovery of federally listed species and to support native plants and animals.

**Bottomland and Floodplain Forest**

*Objective 2.1:* Within 15 years of completing the CCP, inventory and map all bottomland and floodplain forests species composition and distribution within the river's floodplain (Tier 4).

**Discussion:**

Floodplain forests exist wherever streams or rivers flood beyond their channels. Three wet-mesic associations occur along the river or tributary streams on the refuge. They occupy only a small percentage of total refuge lands. They include Beech-White Oak/Mountain Laurel-Haory Azalea-Horse Sugar Forest; Sweetgum-Laurel Oak, Water Oak-Loblolly Pine/Giant Can/Thicket Sedge Forest; and Sweetgum-Tuliptree/Sensitive Fern Forest. These hardwood forests, as well as Cahaba riverwash and canebrake habitats, were last mapped in 2007 (Schotz 2007). Habitats need to be inventoried and re-mapped in certain areas to determine the quality of the habitats and any changes in distribution. The updated information would help prioritize management needs across the refuge.

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## Strategies:

- Hire a forester to assist with inventorying, monitoring, data management, restoration, mapping, and stand enhancement/restoration activities.
- Ideally, these survey methods and habitat nomenclature should follow those identified by Schotz 2007.

*Objective 2-2: Cane Breaks* – Within five years, begin reestablishing viable cane communities to expand and maintain current cane sites by accomplishing invasive species removal and cane plantings on 10 percent annually (Tier 3).

## Discussion:

A former more widespread component of floodplain forests is believed to have been dominated by giant cane. Canebrakes in the Southeast have been identified as a critically endangered ecosystem, with loss of more than 98 percent of their former range (Noss et al. 1995). They existed within forest openings and as an understory component of floodplain forest, and as broad cane thickets without forest overstory.

Although, most current patches are small in size, vast cane patches probably were significant during pre-settlement time periods. The absence of fire and spread of exotic Chinese privet has aided in the loss of cane habitat. The use of rivercane in restoration projects may depend largely on its ability to compete with exotics. A recent study at Duke University shows that transplanted cane survives well in areas dominated by both Chinese privet (*Ligustrum sinense*) and Japanese stilt grass (*Microstegium vimineum*). However, cane clumps tend to expand more quickly when privet is removed (Osland et al. 2009). Cane provides important habitat for a variety wildlife species including: swamp rabbits, Swainson's warblers, bobwhite quail, and a host of other birds, mammals, and insects. Giant cane restoration is generally more difficult than bottomland hardwoods. However, there is a great deal of interest in cane restoration, and in recent years techniques suitable for cane restoration on larger scales have been developed. Although cane restoration costs may be three to four times that of bottomland hardwood restoration, attempts to restore giant cane are considered very worthwhile in terms of the unique wildlife habitat values provided in bottomland hardwood wetland systems. Efforts should be made to determine the pre-settlement distribution of giant cane within the current refuge acquisition boundary and adjoining areas. This information is often available from the original land surveyor's notes, which may have been previously studied by local university researchers. If not, efforts should be made to implement this type of pre-settlement land plant cover research with local universities. Once some idea of the distribution, extent, topographical location, and corresponding soil types of historical pre-settlement cane is determined, the refuge should consider pursuing giant cane restoration on some sites suitable for restoration. Cane restoration may provide an important alternative to bottomland hardwood restoration on some sites, where there are concerns regarding patch size of resulting forest. Cane restoration adds some diversity to bottomland hardwood forests, while contributing a unique habitat preferred by a suite of species of concern. Cane restoration could be done through partners and refuge staff along the river corridor. Giant cane has shown an ability to provide excellent riparian buffer benefits, such as reducing soil erosion, slowing water runoff, and increasing nutrient uptake. NRCS is currently developing standardized planting and management protocols for giant cane establishment in riparian buffers. The refuge should explore opportunities to partner with NRCS to demonstrate giant cane restoration and to promote it as a conservation measure throughout the Cahaba River watershed.

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**Strategies:**

- Hire a biologist to conduct mapping and cane restoration and maintenance as well as inventory and monitor survival and wildlife response.
- Encourage more dense stands of cane by providing increased light to areas already containing cane.
- Pursue cane plantings/restoration on suitable sites.
- Determine pre-settlement distributions (see old surveyor notes, local university studies, etc.).
- Explore opportunities to partner with NRCS to demonstrate cane restoration.
- Explore opportunities to partner with other conservation organizations to accomplish in field restoration activities.
- Consider appropriateness of cane habitat establishment on a site-specific basis, including but not limited to, soils, difficulty of maintenance, fragmentation, other habitat restoration priorities, adjacent habitat types, and benefits to priority wildlife species.
- Control or eradicate Chinese Privet from cane break habitat.

**Pine-dominated Habitats**

*Objective 2.3:* Within two years of CCP completion, inventory and map vegetation cover to establish community structure of pine-dominated habitats and identify opportunities for future prescribed burning (Tier 4).

Discussion:

Community type provides important information concerning fuel loading, sensitivity or adaptation to fire, and priority for future burning. This information is critical to prioritizing longleaf pine restoration efforts and establishing a refuge-wide prescribed burning program. Commercially, loblolly was planted years ago; now need to restore longleaf stands where loblolly stands are presently.

**Strategies:**

- Hire forester to assist with inventorying, monitoring, data management, restoration, mapping, and stand enhancement/restoration activities (Tier 4).
- If unable to hire a forester within the life of this CCP, request the assistance of the regional foresters to update the habitat management plan for the refuge (Tier 2).
- Within two years, extensively inventory forest to assess current conditions and develop a GIS database to assimilate information pertinent to refuge habitat management planning and administration (Tier 4).
- Define stand condition within existing longleaf pine and loblolly plantations for restoration prescriptions (Tier 4).
- Within 18 months after the completion of the inventory and database, coordinate with the Service's Regional Forester to update the Habitat Management Plan for the refuge (Tier 4).

**Loblolly Pine**

*Objective 2.4:* Over the life of the CCP, update and implement the Habitat Management Plan to restore commercially planted loblolly stands to mountain longleaf pine habitat.

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## Discussion:

Many former longleaf pine sites have been planted in even-aged commercial loblolly plantations. Even-aged loblolly pine plantations were planted on uplands, both east and west of the river, prior to refuge establishment. Plantations appear to range in age from 10 to 50 years, and all exhibit similar structural and compositional features. Loblolly pine occupies a dominant position in the canopy, with occasional hardwood associates such as tuliptree, sweetgum, mockernut hickory, and southern red oak. Subcanopy, shrub and the ground cover are highly dependent on the age and density of the loblolly pine canopy. Younger and/or more open stands contain a richer cover of plants. The subcanopy and shrub layers are comprised of early successional deciduous species, which includes the previously mentioned hardwood species. If open to sunlight, the greatest diversity is found in the herbaceous layer, which is dominated by grass (*Poaceae*), composite (*Asteraceae*), and legume (*Fabaceae*) families. The presence and diversity of herbaceous species in loblolly plantations is a good indicator for selecting suitable sites for longleaf pine restoration. Restoration of these planted loblolly pine plantations common throughout the refuge to longleaf pine would allow the refuge to create a landscape rich in biodiversity.

## Strategies:

- With the assistance of the regional foresters, within five years, map loblolly pine plantations, and schedule and remove annually at least 20 acres of timber (Tier 2).
- With the assistance of the regional foresters, where feasible, consider timber harvest contracts as the removal technique. Requirements for site preparation and replanting of longleaf pine or other desired species may be included in the timber sales contract (Tier 2).
- With the assistance of the regional foresters, replant harvested areas with longleaf pine seedlings at a planting density of approximately 600 trees/acre, with survival checks of 300 trees/acre. Seedlings would be planted by contract or volunteers (Tier 2).
- Within five years of longleaf pine seedling planting, with the assistance of regional fire crews, introduce prescribed fire to maintain native herbaceous ground cover which is critical to the restoration of longleaf pine habitat (Tier 2).
- Planted longleaf pine would be treated and managed as an even-aged plantation during the first years (~30 years) of management. As trees exert dominance and mature, the stand would transition into an all-aged stand and management would consider opening gaps and thinning trees (Tier 2).
- If undesirable trees have no commercial value, mechanical removal, girdling, or chemical injection would be considered possible options (Tier 3).
- In some situations, chemical site preparation followed by a prescribed burn may be needed to control shrubs and competing herbaceous vegetation prior to seedling planting (Tier 4).

## Mountain Longleaf Pine

*Objective 2.5:* Within five years of determining longleaf pine stand condition, schedule and reduce hardwoods and unwanted pines on up to 50 acres annually within longleaf pine stands that cannot be controlled through prescribed burning, with the objective of establishing a 25-60 percent canopy cover.

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## Discussion:

Longleaf pine forest exists in a variety of stand conditions. Many former longleaf pine sites have been planted in even-aged commercial loblolly plantations. Longleaf pine stands exhibiting an advance degree of hardwood and loblolly pine encroachment that cannot be restored singularly through prescribed fire, would require structural restoration. Most variation is related to fire exclusion and hardwood encroachment. Forest associations identified as longleaf pine or loblolly pine plantation would be further defined according to stand condition: (1) fire-maintained, (2) midstory and/or hardwood encroachment, (3) longleaf pine stocking, and (4) the presence of off-site pines. In some situations, “encroachment” and “poor stocking” may apply to the same forest area. “Fire maintained” areas include those longleaf pine stands that can be maintained in high-quality condition through seasonal prescribed burning. These forests, should they exist on the refuge, represent high-quality longleaf pine stands, and generally provide the benchmark for restoration efforts. “Midstory and/or hardwood encroachment” occurs in fire-suppressed stands where fire alone would not restore forest structure. These areas may require additional mechanical or chemical treatments to reduce competition. Areas classified as “poor stocking” represent stands where existing longleaf pine stocking is below that needed to produce an adequate number of cone-bearing trees at some future time. These areas may require supplemental hand planting to reestablish an adequate overstory as a future seed source. The last classification “off-site pine presence” includes planted or naturally seeded loblolly pine stands. These areas may require mechanical or chemical treatment, or possibly timber sales and replanting with longleaf pine. A critical factor in selecting the appropriate control technique must consider minimizing soil and ground disturbance within areas with prior minimal disturbance. Maintaining the existing herbaceous ground layer is critical to the long-term success of restoration. Disturbance of this soil layer also opens the forest to weedy annuals and exotics.

## Strategies:

- Implement an updated Habitat Management Plan as a part of the refuge’s Habitat Management Plan (Tier 2).
- Collaborate with Talladega National Forest Oakmulgee District for implementation of fire management plan (Tier 2).
- Maintain 50 acres annually of midstory and overstory trees using selective removal techniques including mechanical removal, girdling, or chemical injection of unwanted hardwoods and pines (Tier 3).

## Prescribed Fire

Longleaf pine associations are fire-dependent communities that slowly evolve into more mesic hardwood communities without fire. A conservative estimate of natural fire frequency for the local area might fall between three and five years. This, however, assumes a condition of long-term maintenance and does not reflect fire-suppressed conditions existing in today’s refuge forests. To reestablish structural conditions needed for fire maintenance, initial fire frequency must be shortened and rely on growing season burns to restore forest conditions. Once restored to an open forest with a fire dependent herbaceous layer, fire frequency and seasonality may be adjusted to reflect a less frequent fire regime.

The existence of fire suppressed longleaf pine forest on the refuge creates an additional concern that must be integrated into management strategy. Prescribed burning in the Southeast has revealed that fire suppressed mature longleaf pine containing high fuel loads can be harmed through the reintroduction of fire (Zutter et al. 2002). Heavy litter accumulation around the base of trees in fire-excluded stands allows feeder roots to penetrate into the rich organic layer. These roots are subject to lethal heating related to



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the duration of combustion and the downward heat pulse, and not necessarily by fire line intensity (Brown and Smith 2000). Fires burning into this deep organic layer can consume the feeder roots and affectively girdle the tree from intense and prolonged heat. It is therefore important to reduce fuel loads within areas that have not burned in recent years before implementing growing season or hot dormant season burns. Mortality is often not immediate, but can occur as a “lag effect” with trees slowly dying over the following two years. Because few mature longleaf pine stands, other than on the Belcher tract, exist on the refuge, this concern is relegated to isolated areas.

After reducing fuel loads through dormant season burns, a sequence of growing season prescribed burns would be scheduled at varying intervals. It is only through growing season burns that encroaching hardwoods, shrubs, and particularly oaks can be reduced or eliminated (Robertus et al. 1993). Preliminary studies have indicated that hardwoods are most effectively controlled by fire during the early part of the growing season (Streng et al. 1993). Prescribed burning during mid- and late-growing seasons tends to be slightly less effective. Where the opportunity exists and the primary objective is hardwood control, prescribed burning would therefore be scheduled early in the season (April-early June). Once burn units are considered restored, a maintenance burning schedule with seasonal variability would be established. It should be recognized that burn units contain a mosaic of community types, and not all areas within the units will burn.

The effectiveness of the prescribed burns would be defined using core monitoring variables (Core Monitoring Elements, Immediate Response Monitoring Variables (< 1YR), and Long-term Variables (> 1YR)) for all fuels treatments as described in the *Monitoring Hazardous Fuels Treatments: Southeast Regional Plan* (USFWS 2013b). As with other wildlife and habitat management actions on refuge lands, monitoring to evaluate fuels treatments and prescribed fire is an integral component for implementing adaptive management. The *Monitoring Hazardous Fuels Treatments: Southeast Regional Field Guide* (USFWS 2013b) describes field methods and protocols for monitoring variables.

*Objective 2.6: Fire Management* – For the next 15 years, continue to build the Wildland Fire Management program (wild and prescribed fire program), with a focus on containing wildfires ignited on and off the refuge at the refuge boundaries and prescribed burning 20 to 30 percent of the refuge annually.

*Discussion:* Cahaba River NWR’s natural communities are far different from those that existed on the historical landscape. Over the past 50 years, much of the region has been converted from longleaf pine forests to loblolly pine plantations. Fire, which was part of natural and anthropogenic processes in this fire dependent ecosystem, has also disappeared from the landscape. The effects of replacing the original upland forests with a long rotation forest crop and the elimination of fire have dramatically altered refuge natural communities. These land use changes, along with soil disturbance and the subsequent spread of invasive species, have added to the impact, further altering refuge uplands. Within this landscape, however, there remains small microhabitats (steep slopes) or residual seed bases (e.g., Georgia aster) that retain some of the original more natural characteristics, or provide a seed bank for reestablishing a fire dependent system through prescribed fire. Approximately 60 percent of the refuge is in pine plantations and clear-cuts, 30 percent is hardwood and hardwood-mixed pine forest, 5 percent is natural longleaf pine forest, and 5 percent consists of aquatic river environments (USFWS 2007).

Prescribed fire will be utilized to mimic the natural role of fire in sustaining ecosystem functions, improving habitat conditions for wildlife and reducing hazardous accumulations of dead fuels. Wildfires occurring within or adjacent to the refuge will be suppressed based on management and environmental objectives at that time.

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**Strategies:**

- Review and update the Fire Management Plan annually (Tier 2).
- Contain wildfires at burn unit or refuge boundaries (Tier 2).
- Write prescribed fire plans for proposed prescribed burn units annually (Tier 2).
- Conduct prescribed fire to promote grassy-herbaceous understory (Tier 2).
- Build a Fuels Monitoring Plan (Tier 3).
- Establish and maintain a fuels monitoring program (Tier 3).

**Piper Mine Reclamation**

*Objective 2.7:* Within five years of CCP completion, work with Alabama Abandoned Mine Lands state agency to reclaim the Piper II Mine site located on the refuge (Tier 2).

**Discussion:**

The U.S. Fish and Wildlife Service, working with the Alabama Department of Industrial Relations (ADIR) Mining and Reclamation Division, would eliminate serious hazards to public health and safety in the form of a dangerous highwall on the refuge. The Piper II Abandoned Mine Lands Project (Piper II Project) would reclaim a portion of a highwall, which averages approximately 80 feet in height and extends a linear distance of 3,750 feet. The highwall was left unreclaimed during past surface coal mining operations. Due to the overall cost (estimated at \$2.6 million), the project is being conducted in phases. Reclamation of the mined area is expected to reduce the potential for transport of sediment and coal-related contaminants to the Cahaba River and is expected to have a long-term beneficial effect.

**Strategies:**

- Refuge would provide oversight on site reclamation.
- Refuge would review plans and contracts regarding site reclamation.
- Refuge would provide access to personnel and contractors to abandon mines sites.
- Refuge would provide technical expertise regarding longleaf pine reforestation of reclaim areas.
- Refuge would provide technical expertise to the implementation of the site reclamation.

*Endangered, Threatened, and Species of Concern***Georgia Aster**

*Objective 2.8:* Within five years of CCP completion, identify and document Georgia aster populations on the refuge (Tier 2).

**Discussion:**

Within the refuge, the Georgia aster is widespread along road openings in the Belcher Tract and along the margins of recently planted longleaf pine restoration sites. Openings through the forest created by a continuing fire regime appear needed to maintain this species. With implementation of a prescribed burning program and longleaf pine restoration that opens the forest floor to sunlight, this plant should benefit and increase in the future.

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**Strategies:**

- Within five years of CCP completion, work with partners to survey the refuge for Georgia Aster populations.
- Once located within refuge boundaries, Service personnel and partners would determine population condition and create GIS database of populations including location, size, and configurations.
- Potential project partnering with Atlanta Botanical Gardens to propagate additional plants to expand populations at identified sites, as well as establish new population sites.
- Maintain this species by conducting annual prescribed burns as described in Objectives 2.6.

**Georgia Rockcress (*Arabis georgiana*)**

*Objective 2.9:* Within eight years of CCP completion, identify and document Georgia rockcress populations on the refuge and initiate habitat improvement.

**Discussion:**

The Georgia rockcress is proposed as threatened under the Endangered Species Act. The refuge has one known population which is included under proposed critical habitat for the species. The species is primarily associated with high bluffs along major river courses, with dry-mesic to mesic soils of open rocky woodland and forested slopes, generally within regions underlain or otherwise influenced by granite, sandstone, or limestone. It is occasionally found in adjacent mesic woods (or glades), but it would not persist in heavily shaded conditions. This species is adapted to high or moderately high light intensities, generally with a mature canopy providing partial shading. Habitat degradation and the subsequent invasion of exotic species, more than outright habitat destruction, are the most serious threats to this species' continued existence. Disturbance, associated with timber harvesting, road building, and grazing, has created favorable conditions for the invasion of exotic weeds, especially Japanese honeysuckle in this species' habitat.

**Strategies:**

- Within five years of CCP completion, the Service's Ecological Services Office would survey the refuge for Georgia rockcress populations (Tier 1).
- Once located within refuge boundaries, Service personnel and partners would determine population condition and create GIS database including location, size, and configuration (Tier 2).
- Within three years of survey completion, conduct timber and invasive species removal by chemical injection to improve native habitat by providing natural openings in the canopy. This would encourage a larger population as well as potentially provide additional locations for population expansion (Tier 3).

**Mohr's Barbara's-Button (*Marshallia mohrii*)**

*Objective 2.10:* Within eight years of CCP completion, identify and document Mohr's Barbara's-Button populations on the refuge and initiate habitat improvement.

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Discussion:

The federally threatened Morh's Barbara's-Button (*Marshallia mohrii*) is found within dolomite glades habitat located on the southeastern portion of the refuge (McDorman Tract. This member of the sunflower family is an erect perennial herb and primarily an inhabitant of open to partially shaded calcareous glades, prairie-like openings, and margins of rock-bedded streams, occasionally expanding into actively maintained roadsides. The species is unable to tolerate deep shade and becomes reduced where hardwoods and understory shrubs invade, and probably was maintained naturally through occasional fire or local soil conditions that promoted a relatively closed grass-sedge community (Kral 1983 in ANHP 2014).

Although *Marshallia mohrii* is tolerant to and can benefit from a moderate level of disturbance, excessive habitat modification has and continues to threaten the existence of the species (Kral 1983, U.S. Fish and Wildlife Service 1988, Patrick *et al.* 1995 – in ANHP 2014). Activities associated with timber production (site preparation, maintenance, logging) appear to be the most pervasive threat to the species. Soil disturbances associated with timber harvesting further promote the incursion of undesirable weedy species, reducing long-term viability. However, Kral (1983) and Patrick *et al.* (1995) assert that canopy removal (hand thinning), if done carefully, will be beneficial to the species. Additionally, vegetation succession as a result of fire exclusion has impacted many sites. To a lesser extent, exotic species threaten some occurrences (ANHP 2014).

**Strategies:**

- Within five years of CCP completion, the Service would determine habitat and population condition and create GIS database, including location, size, and configuration in accordance with the Service's recovery plan (Tier 2).
- Within three years of survey completion, determine and implement appropriate management, including prescribed burns (as described in Objectives 2.6, 2.7, and 2.8), strategic timber thinning and invasive species removal (Tier 3).
- Consider potential project partnering with Missouri Botanical Gardens to propagate additional plants to expand populations at identified sites, as well as establish new population sites (Tier 2).

**Gentian Pinkroot**

*Objective 2.11:* Within eight years of CCP completion, identify and document gentian pinkroot (*Spigelia gentianoides* var. *alabamensis*) populations on the refuge and initiate habitat improvement.

Discussion:

*Spigelia gentianoides* is composed of two varieties (Gould 1996): *S.gentianoides* var. *gentianoides* (hereafter var. *gentianoides*) restricted to five locations within three counties in the Florida panhandle and southern Alabama, and *S. gentianoides* var. *alabamensis* (USFWS 2012b). *Spigelia gentianoides alabamensis* is known only from the Ketona glade communities of Bibb County in central Alabama. It grows up to one-foot tall, in the dry, rocky substrate and produces tubular, pink, upward-pointed blooms during May and June (Davenport and Oberholster 2012).

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## Strategies:

- Within five years of CCP completion, the Service would determine habitat and population condition and create GIS database, including location, size, and configuration in accordance with the Service's recovery plan (Tier 2).
- Within three years of survey completion, determine and implement appropriate management including prescribed burns (as described in Objectives 2.6, 2.7 and 2.8), strategic timber thinning and invasive species removal (Tier 3).

## Invasive and Exotic Plants

*Objective 2.12:* Implement control measures and monitoring of invasive plant species (*Chinese Privet, Alligator Weed, Kudzu, Mimosa, etc.*) as appropriate. Improve basic biological information on occurrence and distribution of flora and fauna influencing the refuge. Prepare a refuge Inventorying and Monitoring Plan (IMP) in accordance with Service guidelines. Within three years, initiate herbicide control of kudzu and treat at least 2 acres annually. Within three years of CCP completion, initiate control of Chinese privet and treat at least 5 acres annually. Within three years, initiate herbicide control of mimosa (Tier 3).

Discussion:

### Kudzu

Kudzu (*Pueraria montana*) is often characterized as the largest non-woody weed problem of forest management in the South. It typically occurs in open, disturbed areas such as abandoned fields, roadsides, and forest edges. The vine, however, spreads more rapidly in open areas, and is slowed as kudzu encounters the shade of a forest edge. Although kudzu typically occurs in disturbed habitats, it can invade forest edges, enveloping, suppressing, and eventually killing mature trees. Fire does not seem to be an avenue for controlling kudzu. In fact, there is some speculation that fire actually promotes seed germination (Harrington et al. 2003).

Kudzu is difficult to eradicate once established. In fact, eradication becomes increasingly difficult with increasing age of the infestation. Generally, elimination of the vine requires frequent defoliation by a single or multiple methods. Mechanical removal, grazing, or mowing can be effective if root crowns are accessible. Herbicides can also be effective, but generally require repeated applications to regrowth in successive years (Miller 2003). Kudzu is found at a number of locations on the refuge. Most infestations are located within the former Piper town site or mining area.

Kudzu infestations can be found on the northern part of the refuge, primarily in and around the former Piper mine and community. Since kudzu is rather narrowly restricted on the refuge, this invasive exotic is a prime candidate for eradication within refuge boundaries. However, multiple applications of herbicide over several years would be required to totally eliminate this exotic.

Eradication, not merely a population reduction, is essential for permanent control. It is important to follow initial treatments with spot applications for as long as new sprouts continue to appear. If follow-up treatments are not exercised, kudzu's quick growth may allow it to reclaim the area within a short time.

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Spraying trees draped with kudzu should not be performed unless some tree mortality can be tolerated. Kudzu is a weed that can be controlled <http://na.fs.fed.us/spfo/invasiveplants/factsheets/pdf/kudzu.pdf> and <http://www.clemson.edu/extfor/publications/ec656/>. Cost of herbicides and time are the factors limiting successful control.

### **Japanese Honeysuckle**

Japanese honeysuckle (*Lonicera japonica*) is an exotic trailing or climbing woody vine that spreads by seeds, underground rhizomes, and aboveground runners. The vine invades fields, forest edges and openings, disturbed woods, and floodplains. While it prefers open sunlight, the vine is adapted to growing in conditions receiving as little as 25 percent light. It has few enemies in North America and is difficult to control once established. The vine is common throughout the refuge, particularly within disturbed environments and longleaf pine restoration areas. Longleaf restoration involving timber removal and replanting represent a potential for further spreading the vine on refuge uplands.

### **Chinese Lespedeza**

Chinese lespedeza (*Lespedeza cuneata*) is an aggressive legume introduced from Asia to provide livestock forage, to reclaim eroded slopes, and as a seed source for wildlife food plots and roadside planting. The plant is both flood and drought tolerant, and is rarely bothered by insects or disease. The seeds remain viable for up to 20 years and control is extremely difficult once the plant becomes established. Chinese lespedeza is widespread across the refuge, particularly along roadsides and within the former Piper townsite. The species, however, is also present to a lesser degree within longleaf pine restoration areas. Fire by itself does not control the plant and can even stimulate further spread. Chinese lespedeza, together with bicolor lespedeza (*Lespedeza bicolor*), are two exotics that would be monitored during the course of longleaf pine restoration programs (Miller 1999c).

### **Mimosa**

Mimosa represents a serious problem in disturbed habitats open to sunlight throughout the refuge. The seeds remain viable for more than five years, making eradication of mimosa a long-term project. Due to mimosa occurring singularly or in small infestations, the primary technique for control on the refuge would involve tree felling and herbicide application to stumps, or stem injection. For resprouts, seedlings, and younger individuals, a selective foliar herbicide spray would be applied. Control of mimosa on uplands would be postponed until monitoring results indicate the effectiveness of fire for controlling this exotic plant.

Mimosa (*Albizia julibrissin*) grows in a variety of soil types, produces a large seed crop, and readily resprouts. It quickly takes advantage of disturbed areas or reseeds from nearby infestations. While the tree prefers full sunlight and is often seen along roadsides, it can tolerate partial shade environments. It often becomes a serious problem along riparian areas, where it becomes established along scoured shores and seeds are easily transported in water. The seeds remain viable for more than five years (Miller 1999a). Mimosa is found along road sides on the refuge. Most infestations are located within the former Piper town site or mining area.

### **Chinese Privet**

Exotic privet (*Ligustrum sinense*) can form dense shrub thickets in a wide range of habitats, including floodplain forests, woodlands, and upland fields. They out-compete native vegetation, eventually forming dense shrub monocultures. They are fast growing, extremely adaptable, thrive in both shade

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and sun, rapidly spread, and produce copious fruit. They have no known biological controls in North America. Once established, privet is extremely difficult to eradicate. Within the refuge, privet can be found in both upland pine plantations and woodlots, and within bottomlands along streams and the river. The most serious infestations, however, occur in low bottomlands and wetlands. Extensive areas along the river and in low cleared areas have been transformed into a shrub monoculture.

Chinese privet can be found throughout most river and streamside communities on the refuge. To a lesser extent, it also occurs on disturbed upland habitats throughout the refuge. This invasive shrub probably represents the most significant impact to natural communities on the refuge. It forms a monotypic shrub layer throughout many wet-mesic forests on the refuge. While effective control can be achieved through a variety of control techniques (mowing, seedling removal, and herbicides), most methods require a nonselective removal of all plants and associated animals in the community. To minimize incidental harm from privet control, treatment on wet-mesic communities would use manual cutting and the application of a basal herbicide to the stem cut. As fire may effectively control privet on uplands, control measures would be postponed until monitoring can determine the effectiveness of fire to control this exotic. It is highly improbable that privet can ever be totally eliminated from the refuge. Efforts would be taken to prioritize areas for intense treatment and concentrated within the highest prioritized infestation that represents a reasonable chance of elimination.

#### **Strategies for all invasive plants:**

- Invasive terrestrial and aquatic plants should be mapped using a GPS and entered into a GIS system.
- Establish a monitoring program of invasive plants to determine rate of spread by annually mapping areas of infestation and comparing to previous year's range.
- After comparison, calculate rate of growth (spread) by invasive plant species of priority management concern.
- Treat at least 5 percent of invasive plants annually.
- Communicate with the state for new invaders, granting opportunities, cooperation possibilities, etc.
- Hire a refuge biologist to assist with the development of priority areas and species for control, mapping, to secure funding for control work, and to aggressively work with partners.
- Ensure private lands biologists communicate with neighbors for interest in developing cooperative projects for invasive species control.
- Develop a complete floristic survey of rare or listed plants.

#### **Privet and Mimosa Strategies:**

- A variety of methods can be used to control or eradicate these species including fire, if used every two to three years, mechanical control, or foliar sprays and basal stem applications which may be applied to the lower portion of each stem.

#### **Kudzu Strategies:**

- Within 5 years of CCP completion, begin manual /mechanical control methods including repeated mowing or cutting of young patches annually in the spring, summer, and fall for 3 to 4 years. In conjunction, prescribed burning would be employed in infested pine stands in spring or fall as needed.

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- Within 5 years of CCP completion, chemical methods would be employed annually until eradicated, including broadcast and spot-spray of foliage and root crowns (clopyralid [legumespecific], picloram, triclopyr, metsulfuron) in May through October or applying chemicals to basal bark or cut stem (triclopyr or glyphosate with bark-penetrating oil) anytime, but avoiding the leaf-out period in spring.

**Goal 3:** Conserve, manage, and restore populations of native animal species representative of the Cahaba River basin.

### **Federally Listed Mussels/Snails**

*Objective 3.1:* Upon completion of the CCP, identify suitable areas on the refuge for reintroductions of federally listed mussels and/or snails.

Discussion:

The Cahaba River is the third largest tributary to the Alabama River within the Mobile River Basin. The Mobile Basin Recovery Plan (USFWS 2000) represents the sole recovery plan for 22 aquatic species in the basin. An addendum document was later prepared to treat six snails in greater detail (USFWS 2005a). Both plans were developed to compliment earlier individual recovery plans. While delisting was considered a recovery objective for some, mussels were considered imperiled to the degree that delisting was unrealistic, and prevention of extinction and further decline were set as recovery objectives. Specific actions needed include:

### **Strategies:**

- Consider options for river and stream mitigation strategies to identify suitable areas that provide high potential for restoration and reintroduction.
- Promote voluntary stewardship to reduce nonpoint pollution from private land use in order to protect habitat integrity and quality.
- Encourage and support community based watershed stewardship planning and action.
- Develop and implement public education programs and materials defining ecosystem management and watershed stewardship responsibilities.
- Conduct basic research on endemic aquatic species and apply the results of this research toward management and protection.
- Develop and implement technology for maintaining and propagating endemic species in captivity.
- Reintroduce aquatic species into restored habitats, as appropriate.
- Monitor listed species population levels and distribution and review ecosystem management strategy.
- Coordinate ecosystem management actions and species recovery efforts.

Recent recovery planning (USFWS 2005a) for six snails in the Mobile Basin provides specific recovery needs for the three snails documented from the refuge (flat pepplesnail, cylindrical lioplax and round rocksnail). The immediate recovery objective for the cylindrical lioplax and flat pepplesnail is reclassification from endangered to threatened. The eventual recovery objective for all three snails is to restore the species to viable self-sustaining levels so that they no longer require protection of the Endangered Species Act. The recovery plan provides five criteria or factors that would be considered for down-listing or delisting snail species:



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- The present or threatened destruction, modification, or curtailment of its habitat or range;
  - Overutilization for commercial, recreational, scientific, or educational purposes;
  - The threat of disease or predation, particularly the presence of the introduced black carp;
  - The inadequacy of existing regulatory mechanisms, particularly sensitivity of snails to certain pollutants; and
  - Other natural or manmade factors affecting its continued existence, particularly that of catastrophic events.

These five species classified as federally endangered, threatened, or as candidates for federal listing have been documented on the refuge, in the immediate vicinity, or are highly suspected to inhabit refuge communities. These species are described in greater detail within the following section.

**Fine-lined Pocketbook (*Lampsilis altilis*) – Threatened** – An endemic mussel found in the Coosa, Tallapoosa and Cahaba river systems. It persists in low numbers at several sites in the Coosa and Tallapoosa river systems, but is extremely rare in the Cahaba River (Mirarchi et al. 2004). A single dead shell was collected from Caffee Creek Shoals during a recent refuge mussel survey (Hartfield 2004). Preferred habitat includes a variety of substrates from clean sand and gravel riffles to depositional areas along stream margins. Females reportedly release glochidia in March with primary hosts including redeye, spotted, and largemouth bass and marginal hosts including green sunfish. Physical modification of river substrate and water quality degradation constitutes threats to the mussel's future. Recommendations for recovery include the need to consider augmentation of existing populations and possible reintroduction into areas where the mussel has been extirpated (Mirarchi et al. 2004).

Recovery of the fine-lined pocketbook to the point of delisting is unlikely in the near future (USFWS 2000). Recovery objectives are:

- to prevent the continued decline of the species by locating, protecting, and restoring stream drainages with extant populations; and
- to restore stream habitats to a degree that would allow expansion and/or reintroduction.

**Triangular Kidneyshell (*Ptychobranthus greeni*) – Endangered** – An endemic mussel found in the Black Warrior, Cahaba and Coosa river systems. Healthy populations remain in the Bankhead National Forest, with small isolated populations found in the Locust Fork, Cahaba River, and upper Coosa River (Mirarchi et al. 2004). The mussel has not been collected on the refuge, but has been found both above and below the refuge, increasing the probability of eventually being discovered on the refuge (Hartfield 2004). Preferred habitat includes riffle habitats with gravel and sand substrate in medium to large streams. A long-term brooder that releases glochidia in March, with the Warrior, Tuscaloosa, and black-banded darters, and the Mobile logperch as primary hosts. The mussel is vulnerable to extirpation because of localized distribution and rarity of remaining populations. Recommendations for recovery include possible augmentation and/or reintroduction (Mirarchi et al. 2004).

Recovery of the triangular kidneyshell to the point of downlisting to threatened is unlikely in the near future (USFWS 2000). The immediate recovery objective is to prevent extinction by relocating, protecting, and restoring stream drainages with extant populations.

**Round Rocksnail (*Leptoxis ampla*) – Threatened** – An endemic snail historically found throughout the Coosa and Cahaba river systems. Within the Cahaba River system, the snail is currently only known from river shoals in Bibb and Shelby counties, Shade and Sixmile creeks, and the Little Cahaba River (Mirarchi et al. 2004). Within the refuge, the snail is considered the most abundant shoal's snail

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and was collected from both Hargrove and Caffee Creek Shoals (Hartfield 2004). Preferred substrate is gravel, cobble, and boulders at depths of less than one meter along the river channel and larger tributaries. Little is known concerning life history, but females are believed to lay eggs from March to mid-May, with individuals living about two years. The rapid decline of this mussel in the Cahaba River is attributed to sedimentation, sediment toxicity, and poor water quality. Recommendations for recovery include possible augmentation and/or reintroduction (Mirarchi et al. 2004).

The recovery plan (USFWS 2005a) establishes the following criteria for delisting this snail:

- a minimum of three natural or reestablished populations have been shown to be persistent for a period of ten years; and
- there are no apparent or immediate threats to the populations.

**Flat Pepplesnail (*Lepyrium showalteri*) – Endangered** – An endemic snail that historically occurred in both the Coosa and Cahaba river systems. It is presently known from only two sites along the Cahaba River, the Little Cahaba River south of the refuge, and shoals north of the refuge in Shelby County. While not recorded on the refuge, populations both north and south of the refuge increase the probability of eventually being discovered on the refuge. Very little is known concerning life history of this rare snail, but preferred habitat includes smooth stones in the rapid current of small to large rivers. Within the Cahaba River, the decline of this snail is attributed to sedimentation and water pollution. Recommendations for recovery include possible augmentation and/or reintroduction (Mirarchi et al. 2004).

The recovery plan (USFWS 2005a) established the following criteria for reclassification to threatened status:

- the existing population has been shown to be stable or increasing over a period of ten years;
- there are no apparent or immediate threats to the listed population;
- a captive population has been established at an appropriate facility, and the species has been successfully propagated; and
- a minimum of two additional populations have been established within historic range.

**Cylindrical Lioplax (*Lioplax cyclostomaformis*) – Endangered** – An endemic snail that historically occurred throughout the Mobile River Basin. Currently, the snail appears extant in only 15 miles of the Cahaba River above the Fall Line in Bibb and Shelby counties (Mirarchi et al. 2004). Within the refuge, the snail was considered uncommon and collected from Hargrove and Caffee Creek Shoals during recent mussel surveys (Hartfield 2004). The snail requires unusual and specialized substrate of mud beneath large rocks located in rapid shoal's current. Little is known concerning life history, with life spans reported from 3 to 11 years. Degraded water quality and modification of river flows are credited with the disappearance of this snail. Recommendations for recovery include possible reintroduction (Mirarchi et al. 2004)

The recovery plan (USFWS 2005a) criteria for reclassification of cylindrical lioplax to threatened status are the same as those provided for flat pepplesnail.

The Alabama Aquatic Biodiversity Center's (AABC) mission is to promote the conservation and restoration of freshwater species in Alabama waters. The center's captive breeding program is a primary tool for reintroductions of federally listed mussels and/or snails. As some of the most endangered groups exist in the Mobile River Basin, the AABC would target these species first. A

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strategy of establishing partnerships, particularly with federal agencies, is considered by the state the most effective approach in accomplishing conservation goals.

The close proximity of the refuge to the center, along with the presence of rare species and critical habitats within the refuge, provides opportunities for both the Service and the center to accomplish mission goals from cooperative partnerships. Refuge staff would work collaboratively with the center to further research, restoration, and reintroduction of sensitive and rare species on refuge portions of the Cahaba River and Little Cahaba River. All programs involving federally listed species would also be coordinated through the Service's Ecological Services Office.

### **Strategies:**

- Manage River Road as a refuge access road, while minimizing erosion/sedimentation and the contribution of contaminants into the river, and summarize the status of road conditions and recommended improvements in the annual refuge plan (Tier 2).
- Work with neighboring landowners to promote voluntary stewardship to reduce nonpoint pollution from private land use (Tier 2).
- Work with local counties and agencies to encourage and support community based watershed stewardship planning and action (Tier 2).
- Work with partners and universities to conduct basic research on endemic aquatic species and apply the results of this research toward management and protection (Tier 2).
- Over the life of the plan, establish a partnership with the Alabama Aquatic Biodiversity Center in conserving and restoring sensitive aquatic species by investigating potential sites for the relocation of captively propagated individuals. This would include at least one annual coordination meeting to discuss (Tier 2).
- Support reintroduction of host species and aquatic threatened and endangered species into restored habitats, by partners and Ecological Services Office through grants and supplemental funding (Tier 2).
- Monitor listed species population levels and distribution in coordination with Ecological Services (Tier 2) or by refuge staff (Tier 3), and review ecosystem management strategies on the refuge (Tier 2).
- Coordinate with Ecological Services on ecosystem management actions and species recovery efforts (Tier 2).
- Evaluate the need to establish a U.S. Geological Survey monitoring station on the refuge, with additional annual review (Tier 3).
- Develop and implement public education programs and materials defining ecosystem management and watershed stewardship responsibilities and how good management and stewardship can benefit these threatened and endangered species (Tier 3).
- Evaluate the overutilization of recreational/educational activities on the refuge and if present manage to minimize impacts on affected river resources (Tier 3).
- Restore stream habitats to a degree that would allow expansion and/or reintroduction on the refuge (Tier 3).

### **Federally Listed Fish**

*Objective 3.2:* Upon completion of the CCP, identify suitable habitat to expand current populations of federally listed fish.

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Discussion:

Alabama's rivers and streams are inhabited by one of the richest fish faunas in North America, numbering around 300 freshwater species (Mirarchi et al. 2004). Continuing development within the state, however, has placed stress on many of these populations, particularly those fish that depend on a free-flowing river system. Navigational and hydrological dams have inhibited upstream migration of fish. Maintenance dredging has eliminated sand and gravel bars important for spawning and has blocked many stream mouths. Pulse releases from hydroelectric dams have adversely altered tailwater habitat and water quality conditions, and sediments and eutrophication have adversely impacted fish populations throughout the state. Continued industrial growth and urban development can be expected to place further stress on these populations in future years.

As Alabama's longest free-flowing river, the Cahaba has escaped some of these impacts. Water quality degradation, sedimentation and hydrologic modification of stream flows, however, continue to place stress on fish populations. Exotic fish species currently are not considered a significant environmental problem in the refuge area (Garland 2006).

These three species classified as federally endangered or threatened have been documented on the refuge, in the immediate vicinity or are highly suspected to inhabit refuge communities. These species are described in greater detail within the following sections.

**Blue shiner (*Cyprinella caerulea*) – Threatened** – The Blue shiner historically inhabited the Cahaba River above the Fall Line. It was last collected in 1971 and now believed to be extirpated from the Cahaba River. Disappearance of this fish from the river is attributed to deteriorating water quality (e.g., nutrification and low dissolved oxygen). As a requirement for delisting, the Recovery Plan (USFWS 1995) specifies at least one adequately protected population exist in the Cahaba River. Additional surveys and possible reintroduction are considered preliminary steps in achieving this objective.

**Cahaba Shiner (*Notropis cahabae*) – Endangered** – The Cahaba shiner is restricted to the main stem of the Cahaba River and Locust Fork. The shiner historically occurred in 76 miles of the Cahaba River, extending from Helena, Shelby County in the north, to Centerville, Bibb County in the south. Currently, it is only found in 15 miles of the river from Centerville upstream to the Piper Bridge (Mirarchi et al. 2004). Five separate collection sites have been recorded on the refuge (Figure 4). Habitat is associated with shoal macro-habitats in quiet backwaters below or adjacent to riffles and runs over clean sand and gravel substrates. The shiner is usually only associated with smaller tributaries during periods of high water where individuals move into the mouths of creeks and streams. The largest and most concentrated collection of Cahaba Shiner's to date was made in the mouth of refuge tributary streams (B.R. Kuhajda, personal communications, February 15, 2006). The reproductive period extends from May to July, with fish maturing at one year of age and possibly spawning the second year. Adults are believed to feed on small crustaceans, aquatic insect larvae, and perhaps some vegetation (Mirarchi et al. 2004). The Cahaba shiner is threatened by high nutrient loads, point and nonpoint source pollution, siltation, and strip-mining activities (NatureServe 2014). The Recovery Plan (USFWS 1992) considers degraded water quality as the greatest adverse impact to the Cahaba shiner.

**Goldline Darter (*Percina aurolineata*) – Threatened** – The goldline darter can be found in the middle portion of the Cahaba River and two of its tributaries, Little Cahaba River and Schultz Creek. It has been extirpated from upper regions of the Cahaba River, and currently is known from Blue Girth Creek upriver to just north of Marvel. A single collection site has been recorded within central portions of the refuge (Figure 4). The darter occurs in swift to moderate current over a substrate of

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cobble or small boulders interspersed with sand, gravel, and pebbles. Riffles often have vegetation on rocks and a border of water willow. It is a benthic feeder taking insects and possibly other macroinvertebrates from rocks. The darter is believed to spawn from late March to early June, and buries its eggs in fine sands or gravel in eddies downstream and between rocks (Mirarchi et al. 2004). Current threats to the goldline darter primarily involve excessive nutrient loads and siltation (NatureServe 2011).

The recovery objective for the darter is delisting with the following criteria (USFWS 2000):

- known populations are shown to be stable or increasing for a period of at least five years;
- a demonstrated trend in water quality improvement in the reach of the Cahaba River occupied by this fish; and
- community developed watershed plans are implemented to protect and monitor water and habitat quality in all occupied watersheds.

**Strategies:**

- The Service and several partners are breeding listed fish with the intent of reintroducing these rare species into suitable habitats across the southeast. The refuge would assist with reintroduction efforts on refuge portions of the Cahaba River and Little Cahaba River (Tier 2).
- Manage River Road as a refuge access road, while minimizing erosion/sedimentation and the contribution of contaminants into the river, and summarize the status of road conditions and recommended improvements in the annual refuge plan (Tier 2).
- Work with neighboring landowners to promote voluntary stewardship to reduce nonpoint pollution from private land use (Tier 2).
- Work with local counties and agencies to encourage and support community based watershed stewardship planning and action (Tier 2).
- Work with partners and universities to conduct basic research on endemic aquatic species and apply the results of this research toward management and protection (Tier 2).
- Over the life of the plan, establish partnerships to conserve and restore sensitive aquatic species populations by investigating potential sites for relocation (Tier 2).
- Monitor listed species population levels and distribution and review ecosystem management strategies on the refuge (Tier 2).
- Coordinate with Ecological Services on ecosystem management actions and species recovery efforts (Tier 2).
- Evaluate the need to establish a U.S. Geological Survey monitoring station on the refuge, with additional annual review (Tier 3).
- Restore stream habitats to a degree that would allow population expansion and/or reintroduction on the refuge (Tier 3).
- Develop and implement community based watershed plans to protect and monitor water and habitat quality in all watersheds where listed species occur (Tier 3).
- Evaluate the overutilization of recreational/educational activities on the refuge and if present manage to minimize impacts on affected river resources (Tier 3).
- Develop and implement public education programs and materials defining ecosystem management and watershed stewardship responsibilities and how good management and stewardship can benefit these threatened and endangered species (Tier 3).

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## Neotropical Migratory Birds

*Objective 3.3:* Within two years, resume established biotic inventories for nesting birds, both east and west of the river, in both upland hardwoods and longleaf pine communities (Tier 3).

Discussion:

Alabama provides critical nesting, wintering, and migratory habitats for a large number of birds. A total of 420 species have been documented in the state. Of this total, 178 are known to nest with 158 regularly nesting in the state. Additionally, 174 species regularly winter, and 80 species migrate through Alabama (Mirarchi et al. 2004).

The Alabama Breeding Bird Atlas project is systematically documenting breeding birds according to U.S. Geological Survey's Topographic Quadrangles in the state (AOS 2006). To date, 84 birds have been recorded during late May and June within the West Blocton East Topographic Quadrangle. Birds recorded for the Breeding Bird Atlas that are designated as "Species of Concern" include Mississippi kite, bald eagle, Cooper's hawk, Kentucky warbler, wood thrush, and Swainson's warbler (Table 1). The bald eagle is the only federally threatened species. Currently, there is no specific refuge habitat critical to the survival of these species. Should bald eagles nest in the future, sensitive nesting habitat could be designated as a "Significant Biological Area."

According to the Partners in Flight (PIF) Executive Summary for the Southern Ridge and Valley Bird Conservation Plan (Demarest 2006), the greatest conservation issue in this region is conversion of hardwood and mixed pine/hardwood forests to monocultures of loblolly pine, urbanization, and agriculture. A large percentage of natural vegetation in the region has been cleared, and mature forest and the birds dependent on mature forest are less secure here than in any other physiographic area in the southern Appalachians. The long-term health of priority bird populations is considered dependent on maintenance and management of remnant forest, as well as aggressive restoration efforts. The executive summary recommends at least eight upland hardwood forest patches greater than 4,000 hectares be sustained and that the number of such patches in the 4,000- to 40,000-hectare range be increased. More than 80 percent of the mixed mesophytic hardwood acreage within these patches should be managed for long rotation or old growth. All existing longleaf habitat should be actively and appropriately managed with fire, and current acreage should be increased where possible. Restoration of refuge uplands to the original cover of longleaf pine and associated pines and upland hardwoods is consistent with PIF goals and objectives

PIF conservation goals provide an example of benefits of viewing the refuge as a regional landscape unit. The executive summary for the Ridge and Valley Bird Conservation Plan (Demarest 2006) recommends that eight upland forest patches (10,000-100,000 acres) be maintained within the physiographic province for the benefit of birds dependent on mature forest. While the refuge alone can never accomplish this goal, working together with regional partners greatly increases chances for success.

Alabama's Comprehensive Wildlife Conservation Strategy planning process further supports regional approaches in their statewide conservation actions (ADCNR 2005): "ADCNR and other land management agencies (e.g., the Service) should use a landscape management approach to enhance greatest conservation need (GCN) species and their habitats."

The refuge is located along the north-south flowing Cahaba River, and provides inviting habitat for both resident and migrating species. The presence of both aquatic and upland habitats on the refuge further increases the diversity of birds that can be expected on the refuge.

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The refuge represents a minor part (3,414 acres) of a much larger regional landscape. Much of the uplands southwest of Birmingham (Bibb, Perry, and southwest Shelby) remain in forest. Ownership ranges from private individuals and industrial forestry to federal, state, and non-governmental organizations. Particularly significant are the Talladega National Forest (12 miles south and southwest), and The Nature Conservancy lands (scattered south of refuge). Viewed in a regional context, the refuge has the potential to contribute to the viability of a much larger regional landscape ecosystem.

Within the refuge, management strategies can be used to maximize habitat values for natural communities occurring on the refuge. Forested edge, openings, and disturbances to forest cover and soils are responsible for modifying habitat conditions favorable to species associated with early successional or disturbed habitats. As the regional landscape becomes more fragmented and disturbed, habitat conditions provided by forest interior become rarer. Many of the plants and animals dependent on forest interior also decline.

### **Strategies:**

- Point counts would be reestablished in selected stands of both upland hardwoods and longleaf pine communities to measure changes in both flora and fauna over the course of management programs that increase forest interior and restore historic longleaf pine woodlands.
- These point counts would be conducted before and after prescribed burning efforts to measure long-term effects of restoration and burning.
- Support would be solicited from local universities and partners to provide assistance with survey efforts.
- An effort would be made to accomplish at least one survey every three-year management cycle for habitats of biological concern.

*Objective 3.4:* Within two years, review forest openings for fragmentation, and restore, where possible, at least 5 acres annually of small openings that can be returned to continuous forest cover (Tier 4).

### **Discussion**

Research in Alabama (Soehren 1995) has demonstrated that forest fragmentation strongly affects the total number of neotropical migratory birds and in particular the number of low nesting birds. Further research on the relationship of fragment size to nest predation (Keyser et al. 1998) concluded that reduced forest size increases predation on ground nests and that nest clustering increases predation of ground nests by large predators. These results suggest a causal link between increased predation rate, fragment size, and the observed abandonment of small forest fragments by neotropical migratory songbirds.

Recent research in the Southeast (Buehler and Miles 2004) has further investigated the importance of small maintained forest openings in contributing to fragmentation and declining avian populations. This study focused on the role of wildlife food plots and small openings to breeding bird populations. The study concluded that effects are variable and depend greatly on the landscape in which the forest is located. In a landscape surrounded by farms, disturbance, and early successional habitat, adverse effects are likely. Recommendations for relatively intact forests within a developed landscape include “avoiding the creation of new openings and allowing existing openings to regenerate to forest.” Additional recommendations in another similar

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landscape involve “creation of new openings, including extensive daylighting of forest roads, should be conducted only in areas that already possess openings to avoid negative effects on areas with high-quality habitats for forest interior birds.”

Management objectives are intended to maximize forest interior and minimize openings, firebreaks and other disturbances within intact forest. Generally, when an activity requires opening or clearing forest cover, an attempt would be made to place this disturbance in peripheral areas that minimize intrusion. An opening or disturbance to forest cover would be defined as an activity that opens the forest canopy creating edge or ecotonal habitat. Firebreaks that are narrow and maintain a closed canopy cover are not necessarily fragmentary. Forest canopy opening through longleaf pine restoration programs follow natural processes that historically existed in the region’s forests. Native species have evolved and adapted to surviving in this community type and, therefore, benefit from the reestablishment of historic forest conditions.

A variety of past land uses are responsible for opening the forest canopy (coal strip-mining, logging roads and loading decks, coal-bed methane well sites, etc.). Nonessential openings would be restored according to their size and requirements. Small openings would be allowed to revert to forest through natural succession. Larger openings would be considered for restoration through seedling replanting. Seedling type would be selected according to habitat suitability.

The objective of maximizing forest interior and minimizing edge and disturbed habitat would benefit many neotropical birds and game species. This approach is consistent with the Service’s Biological Integrity Policy for the Refuge System.

**Strategies:**

- Forest openings would be recorded on maps and reviewed according to appropriate restoration needs.
- Some areas may be designated for restoration by seeding from adjacent communities and allowed to proceed through natural succession.
- Other larger areas may possibly require seedling planting. This may be accomplished through planting by Service personnel, volunteers, or outside contracts.

**Gray Bat**

*Objective 3.5:* Upon completion of the CCP, continue established surveying, and monitor foraging gray bats and other bat species (Tier 3).

**Discussion:**

With few exceptions, the gray bat is restricted to caves for roosting. It often travels up to 30 miles from roosting caves to forage during the night. Available roosting opportunities on the refuge are rare to nonexistent, but the bat likely forages along the river and larger refuge tributary streams. Additionally, Indiana bats may also be found on the refuge. Continued survey efforts would help identify which bat species are found on the refuge and the habitats that they are utilizing.



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**Strategy:**

- Over the life of the CCP, establish partnerships with local universities to conduct semi-annual mist net surveys and annual acoustic surveys to determine habitat foraging preferences and species identification and distribution.

**Bald Eagle**

*Objective 3.6:* Annually monitor eagle activity on refuge and determine management strategies to minimize disturbance (Tier 3).

**Discussion:**

Bald eagles are found throughout Alabama along major lake and river systems. Due to devastating effects of DDT, the breeding population disappeared from the state in the 1960s. However, with the banning of DDT and intensive restoration efforts in following years, the eagle has made a spectacular recovery with 47 statewide confirmed nests in 2003 (ADCNR 2004). Although fish comprise the major part of their diet, small animals such as rats, rabbits, opossums, raccoon, snakes, and turtles are also eaten. They usually nest in large trees near water. While confirmed nesting has not been documented along the Cahaba River (Keith Hudson, personal communications), eagles have recently been observed by refuge personnel and others (AOS 2006) during the spring. It is highly probable that eagles are or in the future would nest along the river on the refuge.

**Strategies:**

- Annually identify and map any bald eagle nests on the refuge.
- Reevaluate management activities in close proximity to identified nests to minimize disturbance to these sites.

**Other Surrogate Species**

*Objective 3.7:* Over the life of the plan, work with partners to inventory and monitor for surrogate species (Tier 2).

**Discussion:**

Surrogate species are a component of the Strategic Habitat Conservation (SHC) approach to protecting habitats and wildlife. Since the sheer number of species for which the Service, states, and partners work with make designing and conserving landscape-scale habitats impractical on a species-by-species basis, we are now developing a process to collaboratively identify surrogate species representing other species or aspects of the species environment (e.g., water quality, sagebrush, or grasslands). Surrogate species is a commonly used scientific term for system-based conservation planning that uses a species as an indicator of landscape habitat and system conditions. At the completion of this Draft CCP/EA, surrogate species have yet to be identified for the Appalachian LCC; however, it is critical for the refuge to focus resources to inventorying and monitoring of such species after identification.

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**Strategy:**

- Once surrogate species have been identified, establish protocol and timeframe for inventorying and monitoring of each surrogate species.

**Invasive and Exotic Animals**

*Objective 3.8:* Identify and control, as needed, populations of invasive and exotic animals on the refuge (Tier 3).

Discussion:

Currently, feral hogs are not found on the refuge; however, they are known to occur in the vicinity. Early detection and control efforts are critical in preventing this species from becoming established on the refuge.

**Strategies:**

- During the course of routine refuge management work, staff would record signs and/or individuals within refuge lands.
- If found, immediate action would be implemented to remove any individuals located.
- Within two years of the plan's approval, develop an Integrated Pest Management Plan.

**VISITOR SERVICES**

Goal 4: Ensure visitors of all abilities and varied interests have opportunities to participate in and enjoy the refuge for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation, whereby motivating them to value, support, and contribute to the refuge and Refuge System, increase their understanding of the Cahaba River and upland habitats, and help them become better environmental stewards.

**Hunting**

*Objective 4.1:* Continue a hunting program on the refuge that provides recreational opportunities and maintains game species at sustainable population levels.

Discussion:

The Service has completed a hunting plan (USFWS 2004c) and opened the refuge for hunting in cooperation with the Alabama Department of Conservation and Natural Resources. The refuge is included within the administrative regulations governing the Cahaba River Wildlife Management Area.

Maintaining game populations through an active hunting program not only provides recreational opportunities, but also is important in maintaining a stable ecosystem. Deer, in particular, have few natural population controls and can impact community structure through over-browsing, selectively impacting the most palatable plants to the greatest extent. Resulting community structure can then become skewed to favor plants less preferred as browse. While the overall significance of over-browsing on longleaf pine community structure is unclear, the maintenance of a stable game population is considered desirable in establishing and restoring existing forest systems on the refuge.

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Cahaba River NWR is open to hunting in partnership with the State of Alabama's Wildlife Management Area hunting program. Public hunting is in accordance with state regulations for the Cahaba Wildlife Management Area (WMA), which is directly adjacent to the refuge. WMA regulations apply for all permitted species, bag and possession limits, and archery and general gun hunt days. All hunters must possess a valid Alabama State Hunting License and WMA permit.

Open season for small and big game is concurrent with seasons established by the State of Alabama. Hunting is permitted in all areas of the refuge. However, public entry is currently limited to the River Road access. The following exceptions apply to hunting on the refuge:

- Deer – Archery only. No gun deer hunting permitted.
- Woodcock, Mourning Dove, Waterfowl – No open season
- Trapping – No open season
- Camping, ATV use, and horses are not allowed on the refuge

**Strategies:**

- Continue to partner with the Alabama Department of Conservation and Natural Resources to coordinate hunts and provide law enforcement assistance on the refuge (Tier 1).
- Annually post seasonal signs at kiosk alerting all visitors that hunts are in progress (Tier 2).
- Annually collect check station data from the state to analyze hunt data on the refuge (Tier 2).

**Fishing**

*Objective 4.2:* For the life of the plan, continue to provide fishing opportunities consistent with state regulations, including night and bank fishing.

Discussion:

Fishing is the main recreational use on the refuge. The refuge lacks a current fishing plan. Most recreational fishing occurs from the river bank, wading into the river, and by boat or canoe. From the refuge, access to the river is currently limited to the River Road area. The refuge is the only public access point for fishing for approximately 30 river miles. An improved boat launching area was constructed in 2005. The improvement concentrates launching activities and helps alleviate bank erosion along River Road.

**Strategies:**

- Continue to work with the state on an annual basis to coordinate fishing opportunities on the refuge (Tier 1).
- Draft and complete a refuge visitor services plan within 5 years of CCP completion (Tier 3).

**Wildlife Observation and Wildlife Photography**

*Objective 4.3:* Within five years of completion of the CCP, work with partners to enhance wildlife observation and photography opportunities on the refuge.

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## Discussion:

Of the 20,000+ visitors to the refuge, most of them are coming for observation and photography opportunities. Rather than wildlife though, the majority of these visitors (over 60 percent) are coming to the refuge from May 1 to the middle of June to see the Cahaba Lily in bloom. During this time, 11,000 to 12,000 visitors come to the refuge. During the other 10 months a total of 8,000 to 9,000 visitors come for all public uses combined.

Visitors observe wildlife while canoeing the river and hiking the trails. Common wildlife seen include: various reptiles and amphibians, songbirds (e.g., Swainson's warbler, northern parula, worm-eating warbler), wild turkey, and white-tailed deer.

Along Piper Trail there are two scenic overlooks providing unique opportunities for wildlife photography and observation of the Cahaba River and adjacent habitats. River Road (2 miles) and Cahaba River Overlook Trail (1 mile) also offer good opportunities for wildlife and habitat observation/photography.

## Strategies:

### Now (within 1-2 years)

- Install distance markers on Piper Trail at ¼ mile intervals (Tier 2).

### Intermediate (3-7 years)

- Place benches at the overlook areas and along the Cahaba Overlook road (Tier 2).
- Develop and install signage along Piper Trail giving hikers an option to utilize the looped trail by returning along the Cahaba Overlook Road (include information about the associated distances) (Tier 3).
- Identify and sign a trail which runs north from the River Road parking lot (Tier 3).
- Develop refuge trail brochure (Tier 3).

### Long term (8-15 years)

- Develop an auto tour route when High Wall is removed to provide access through the eastern portion of the refuge (Tier 3).
- Work with partners to develop a shuttle system during peak lily season (Tier 3).
- When staff or volunteers are stationed fulltime at Cahaba River NWR, add view scopes to the observation platforms at the Piper Trail overlooks (Tier 4).
- Construct a walking bridge over Caffee Creek (Tier 4).

## Environmental Education

*Objective 4.4:* Within five years of CCP approval, work with partners to develop and present educational programs that emphasize the importance of wildlife habitat and population management.

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## Discussion:

Currently Cahaba River is unstaffed, and as a result relies heavily on local groups and volunteers to facilitate its public use programming. The refuge has not yet implemented a formal, curriculum-based environmental education program tied to national and state education standards. To date, the lack of refuge staff has also prevented the development of any significant relationships with the local school system.

In years past, efforts were made to create a presence within the community through the delivery of environmental education programs to local schools and organizations. Currently, the lack of staff has prevented the refuge from continuing these programs.

Although no environmental education programs are currently being led by refuge staff or volunteers, the refuge has partnered with the Cahaba River Society, a non-profit organization based in Birmingham to facilitate the CLEAN (Children Linking with the Environment Across the Nation) project which promotes hands-on environmental education in public, private, and home-based schools and church groups to educate youth about the Cahaba River watershed. Potential opportunities to expand environmental education efforts also exist in correlation with Friends of the Cahaba River National Wildlife Refuge, Living River Camping Ministry, and the Alabama Cooperative Extension System in Centreville.

## Strategies:

### Now (1-2years)

- Continue participation in Forestry Awareness Week Now (Tier 2).
- Develop an Educator Resource page and a Children's activity page on the refuge website (Tier 3).
- Work with local educators to identify what environmental education is occurring in the area (formal and non-formal) and how the refuge can work with these organizations to include information about the refuge in their programs (Tier 3).

### Intermediate (3-7 years)

- Develop a herps brochure for refuge distribution (Tier 3).
- Contract with an educator to develop loaner trunks with Cahaba River NWR information/activities – one for each elementary school in Bibb County (Tier 3).
- Partner with local universities to bring students to the refuge as part of environmental education or teacher training or classroom labs (Tier 3).
- Create opportunities for scouting groups to come out and explore the refuge and earn merit badges (Tier 3).

### Long term (8-15 years)

- Partner with Living Rivers to provide information about the refuge in their programs (Tier 2).

## Interpretation

*Objective 4.5:* Within five years of completion of the CCP, work with partners to increase opportunities for interpretation on the refuge.

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Discussion:

Currently, the refuge has little interpretive signage, but is in the process of installing a number of new signs to be strategically placed within the refuge. A kiosk listing regulations and providing information to the public is located along the refuge's entrance road.

At this time no facilities exist for visitor use. Public interaction with refuge personnel is rare as there is no staff stationed at the refuge. Although much needed, until additional funding and staff positions are added to the refuge, it is unmanageable to maintain a visitor's center.

**Strategies:**

Now (1-3 years)

- Develop interpretive signs for refuge trails (Tier 3).
  - fire as a management tool
  - longleaf pine
  - geology

Long term (6-12 years)

- On the refuge website, develop video field trip of the river during lily season (Tier 3).
- Develop an app-based auto tour of the refuge (Tier 4).
- Develop a virtual geocache activity for the refuge (Tier 4).

*RESOURCE PROTECTION*

**Goal 5: Resource Protection:** Identify, conserve, and protect natural and cultural resources through partnerships, acquisition, and land protection programs within the Cahaba River watershed.

**Water Resources**

*Objective 5.1:* Over the life of the CCP, gather and monitor critical water quantity data for both surface water and groundwater to specifically document the magnitude, frequency, timing, duration, and rate of ecological flows needed (with seasonal, temporal, and spatial variability).

Discussion:

For many freshwater aquatic systems like those protected by Cahaba River NWR, water quality and water quantity are the two most critical factors influencing the ability of managers to meet the primary purposes of refuge establishment.

Water quantity concerns on the refuge include urban development, population growth, surface water and groundwater withdrawals, alteration of the natural flow regime ecological flows, and large-scale and long-term impacts from climate change on multiple factors influencing water quantity and quality.

Critical data needs include maintaining existing U.S. Geological Survey stream gage and groundwater well data, and adding gages and wells where necessary.

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## Strategies:

- Coordinate with U.S. Geological Survey to maintain existing stream gages and groundwater wells (Tier 3).
- Develop proposals to secure funding for additional water quantity assessments and utilize academic resources to the degree possible (Tier 3).
- Hire biologist to assist in the implementation of these monitoring strategies (Tier 3).

*Objective 5.2:* Over the life of the CCP, gather and monitor critical water quality data for surface water to specifically document (Tier 3).

## Discussion:

For many freshwater aquatic systems like those protected by Cahaba River NWR, water quality and water quantity are the two most critical factors influencing the ability of managers to meet the primary purposes of refuge establishment.

Rapid urbanization and commercial development in the area south and southeast of Birmingham (Jefferson, Shelby and St. Clair counties) are the primary forces shaping water quality conditions and biological communities both directly in the upper Cahaba River drainage and indirectly in the lower Cahaba River drainage through material and pollutant transport (CRBCWP 2003).

Water quality concerns on the refuge include upstream impacts from urban development (e.g., excess sediment and nutrients, water withdrawals, run-off, altered flows, point source and nonpoint source pollution), wastewater discharge from treatment plants, and impacts to both surface water and groundwater from legacy, current, and future energy development in the watershed.

Birmingham draws water from both the Black Warrior River and the Cahaba River systems. During periods of drought, nearly all of the flow of the Cahaba River is removed at the Birmingham intake point (Highway 280 Bridge) and only a portion is returned downstream as treated wastewater. The remainder is emptied into the Black Warrior River Basin as an inter-basin transfer (Howard et al. 2002).

Wastewater treatment plant discharges influence the Cahaba River as one quarter of Alabama's population draws its water from, and/or discharges treated wastewater into, the Cahaba River watershed. There are 12 major and 19 minor permitted wastewater discharge points upstream of the refuge, over 100 industrial discharge permits in the upper watershed of the Cahaba River, and over 40,000 septic systems within the watershed (ADEM 2006). Approximately 27 million gallons of treated wastewater are released into the watershed daily, with additional permitted capacity to allow over 43 million gallons/day. Permit violations at major discharge locations for nutrient or nutrient related parameters have occurred (Howard et al. 2002).

Significant man-made alterations to the landscape surrounding the refuge include mining and logging activities, energy development, groundwater and surface water diversions, and urbanization. The impact of increased urbanization, along with associated mining and industrial development in the upper Cahaba River Basin have degraded water quality and threaten the future of the diverse biological communities in the basin (ADCNR 2009). The U.S. Geological Survey has conducted surface water quality monitoring at 116 sites within the Region of Hydrologic Influence, including streams, lakes and springs. U.S. Geological Survey monitored surface water quality from 1976 to

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1983 at a site within the northern part of the refuge. Within or in the vicinity of the Cahaba River NWR acquisition boundary, there are six surface water quality sites. One-time samples associated with the refuge establishment were collected in 2009 at five of the six sites.

**Strategies:**

- Individual streams would be reviewed through aerial photography to determine adjacent land uses and potential impacts of those uses.
- Develop a partnership with U.S. Geological Survey to reestablish regular sample collection to record measurements for metals, nutrients, and other parameters, including pH, conductivity, and dissolved oxygen.
- Continue heavy metals quarterly monitoring within the coal mining reclamation site.
- Hire biologist to assist in the implementation of these monitoring strategies.

*Objective 5.3:* Over the life of the CCP, in order to most effectively manage and protect the Cahaba River, it is critical to continue, enhance, and expand support of existing and future partnerships within the Cahaba River Basin, with other conservation organizations, adjacent landowners and the University of Alabama.

Discussion:

The most significant adverse impact to refuge aquatic communities is attributable to upstream water quality degradation. Major groups working on regional water quality improvements include The Nature Conservancy, Cahaba River Authority, Clean Water Partnership, Storm Water Management Authority, and Cahaba River Society.

Lands bordering the west refuge boundary are owned by the University of Alabama. This rather isolated part of the refuge lacks a boundary road or firebreak, with much of the adjacent university land showing evidence of recent timber harvest. The proximity of university land to the refuge offers a variety of opportunities for cooperative agreements and partnerships with the University of Alabama. Examples of subject areas for further consideration include cooperative burning programs, cooperative natural resource management programs, and research and educational partnerships. Further research and educational possibilities exist for the establishment of a research facility and access through the refuge for aquatic field programs.

Refuge tributary streams (Caffee Creek, Little Ugly Creek, and unnamed tributary streams) provide critical escape habitat for fish during sediment and contaminant episodes along the river's main stem. Maintaining and protecting water quality in these streams may be more critical, in the near term, than water quality improvement efforts along the river. For example, the largest collection of Cahaba shiners ever made occurred in the mouth of tributary streams on the refuge (Bernard Kuhajda, personal communications). Protecting and improving water quality of these streams and avoiding catastrophic contaminate loading upstream would assure these areas remain available as escape habitat should adverse events occur along the Cahaba River.

**Strategies:**

- Participate as a stakeholder on regional water quality improvement efforts within the upper Cahaba River Basin, using The Nature Conservancy, the Cahaba River Society, and others as a gateway (Tier 3).



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- Service personnel would attend public and planning meetings and participate in programs that have potential for improving water quality and decreasing sediment loads in the Cahaba River (Tier 3).
  - The Service would provide verbal and documented support to partners on existing effects to refuge biota, particularly adverse impacts on federally listed species, from continued deteriorating water quality and sediment (Tier 3).
  - Establish cooperative programs and partnerships with the University of Alabama for lands along the western refuge boundary, and meet at least once annually on the status of these programs and the possibility of new partnerships (Tier 3).
  - Hire a refuge biologist to assist with the development and enhancement of these partnership activities (Tier 3).
  - Ensure water quality of priority refuge tributary streams through partnerships with adjacent landowners, and coordinate possible support and expertise in remediating, restoring, and/or protecting streamside habitat from actions that contribute contaminants or degrade water quality at least once annually (Tier 4).

### **Land Protection**

*Objective 5.4:* Over the life of the CCP, prioritize tracts within the acquisition boundary for purchase based on improved riparian habitat conditions, contribution to biological objectives, closure of gaps between existing tracts, and improvement of public access.

#### **Discussion:**

Cahaba River NWR was established in 2002 under the authority of The Cahaba River National Wildlife Refuge Establishment Act, Public Law No. 106-331, passed on October 19, 2000. This legislation directed the Secretary of the Interior to acquire up to 3,500 acres of lands and waters within the boundaries of the refuge. In 2004, the Regional Director of the Service (Southeast Region) authorized the expansion of the acquisition boundary of the refuge to include an additional 330 acres at the confluence of the Cahaba and Little Cahaba rivers. In 2006, Public Law 109-363 was signed by the President, authorizing the further expansion of the acquisition boundary by 3,600 acres. In 2008, the Regional Director (Southeast Region) authorized the expansion of the acquisition boundary of the refuge by an additional 354 acres. The refuge currently contains 3,681 acres in Bibb County, with an approved acquisition boundary of 7,784 acres, leaving approximately 4,103 acres un-acquired. As tracts become available for purchase, acquisition would be considered if those tracts best meet the purposes of the refuge and there is available funding.

#### **Strategies:**

- Focus on biological/environmental voids and gaps that could be filled via land additions to increase public access, provide better water management capabilities, facilitate existing refuge habitat goals and objectives, and that reduce impacts of land use adjacent to and within the Cahaba River watershed (Tier 2).
- Continue to acquire lands from willing sellers (Tier 2).
- Within 15 years of CCP completion, work with partners to identify and conserve priority lands within the Cahaba River watershed to provide long-term protection of valued resources within the watershed (Tier 4).

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## Cultural Resources

*Objective 5.5:* Within 15 years of CCP completion, complete a comprehensive historical and archaeological resource survey on current refuge lands and any additional lands acquired.

### Discussion:

Although there are no known cultural resources on the refuge covered by the CCP at this time, the refuge would protect any newly discovered or unknown resources.

### Strategies:

- Maintain records of refuge survey data for cultural and archaeological sites as identified (Tier 1).
- As archaeological and cultural resources are newly discovered, coordinate with the regional archaeologist to get them cataloged and assure appropriate archival (Tier 1).
- Ensure cultural resource management and protection strategies are integrated into refuge management plans such as Fire Management Plan, Road Maintenance Plan, etc., if sites are identified (Tier 1).
- Monitor for vandalism and degradation of sites as identified (Tier 2).
- Contact Regional Archaeologist prior to construction or significant ground disturbance projects and complete a request for Cultural Resource Review to determine appropriate steps necessary for compliance (Tier 2).
- A layer for archaeological and historical sites would be integrated into the refuge's GIS Database, if identified and maintained as confidential per National Historic Preservation Act and Archaeological Resources Protection Act (Tier 2).

## REFUGE ADMINISTRATION

**Goal 6:** Provide sufficient refuge infrastructure and staff to implement a comprehensive refuge management program in order to protect and manage the natural and cultural resources of the refuge.

### Staffing

*Objective 6.1:* Maintain the refuge manager position, fund the assistant refuge manager position, and add the following shared positions (shared positions to be shared between Mountain Longleaf, Cahaba River and Watercress Darter NWRs): biologist, equipment operator and park ranger (Tier 3) forester, law enforcement officer, and biological technician (Tier 4) (Figure 14).

### Discussion:

Additional full-time staff is required to ensure permanence and progression of refuge programs, and to ensure that Cahaba River NWR contributes in the achievement of the Service's mission and as a conservation unit of the Refuge System.

The refuge currently has a refuge manager located in Anniston, with shared duties for two other refuges. A zone officer periodically patrols the refuge and responds to incidents. Currently, the organizational structure of refuge staff includes an unfunded assistant refuge manager position as well. In addition, there is a need for biological, maintenance, forestry, and education/outreach staff to manage the refuge in accordance with its purposes and goals. There is also an immediate need to complete basic inventory and begin monitoring refuge habitats and wildlife populations. Future increases in visitors and additional impacts from an increasingly developed landscape surrounding

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the refuge necessitate an effectively staffed refuge. Additional staff is also needed to facilitate and foster current and new partnerships to provide additional support of the refuge.

**Strategies:**

- Provide continuing education and training opportunities to all staff to ensure a highly competent and motivated team (Tier 2).
- Provide employees with safe and efficient equipment and vehicles for refuge operations and maintenance (Tier 2).
- Hire term and part-time employees, as funding allows, filling staffing gaps until full-time employee funding becomes available (Tier 2).
- Explore modifying the existing assistant refuge manager position to an assistant refuge manager trainee position in support of the 2013 Priorities and Principles for Moving our Workforce Forward (Tier 2).
- Place priority on hiring a full-time wildlife biologist (Tier 3) and forester (Tier 4).

**Infrastructure**

*Objective 6.2:* Over the life of the CCP, maintain and improve refuge infrastructure, including River Trace and Belcher roads, refuge trails, kiosks, and overlooks.

Discussion:

River Trace and Belcher Roads are constantly eroding due to their placement and slope causing frequent repairs and maintenance. River Trace Road is the main road used by visitors to access the refuge. The road's location, adjacent to the river, provides excellent access however accelerated degradation and erosion occurs frequently. Improvements were made to the road in late summer 2014 to reduce the amount of sediments entering the river and improve visitor safety. These improvements included replacing lost road base and surface, installing concrete low water crossings and riprap where appropriate. The steep slopes of Belcher Road must be maintained regularly to provide administrative and fire access for Service personnel. The road also serves as easement access for a refuge neighbor's land. In addition; refuge trails, kiosks and overlooks require periodic maintenance

**Strategies:**

- Partner with Wheeler Refuge Complex or rent/contract equipment to maintain refuge roads on an as needed basis (or semi-annual, at a minimum) (Tier 2).
- Provide regular maintenance to refuge trails, kiosks and overlooks as needed (Tier 3). Partner with the Friends of the Refuge, The Nature Conservancy and Cahaba River Society to restore vegetation and control invasive species along River Road (Tier 2).

**Facilities**

*Objective 6.3:* Within the next five years, a new complex office and maintenance shop would be constructed in Anniston. The present facility would become intern and volunteer housing (Tier 2).

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Discussion:

As staff is added to the complex, these new facilities would support increased refuge function. The new shop would adequately meet current complex needs and would likely remain so for many years to come. The new housing facility would tremendously improve the complex's ability to recruit term and temporary help and foster research partnerships. Site location has been selected.

**Strategies:**

- Work with Regional Office Engineering staff to design a building. Begin construction of project building.

Goal 7: Promote public awareness, through the use of volunteers and increased cooperation with partners, of the resources of the Cahaba River NWR and the Refuge System. Encourage increased participation in achieving the desired future condition of the refuge.

**Partnerships**

*Objective 7.1:* Continue to nurture, enhance, and expand refuge relationships with current and potential partners to expand the refuge's capacity to protect and monitor biological resources, implement habitat improvement projects, enhance interaction and education of refuge visitors, and encourage cooperative programs with academic institutions and non-governmental organizations.

Discussion:

The refuge would maintain and continue an aggressive approach to work with others to conserve, protect, and enhance fish and wildlife and their habitats. The Service is fully committed to maintaining and expanding joint endeavors and cooperation with educational institutions, researchers, local governments, state government agencies, and other federal agencies, as well as organizations, schools, volunteers, and conservation organizations. To this end, the refuge would maintain and enhance existing partnerships, as well as building new partnerships with organizations, residents, and business owners of the area.

**Strategies:**

- Continue working with current partners to promote the conservation of natural resources within the watershed (Tier 2).
- Facilitate new partnerships to fill staffing gaps for habitat enhancement and threatened and endangered species protection (Tier 2).
- Update Friends of the Refuge agreement to comply with current FWS policy standards. (Tier 2).
- Continue working with and growing the Friends group to assist in outreach, visitor services support, and habitat improvement projects on the refuge (Tier 2).
- Expand existing and develop new partnerships to promote research opportunities on the refuge (Tier 3).

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## **Volunteers**

*Objective 7.2:* Over the life of the CCP, continue to build the volunteer program.

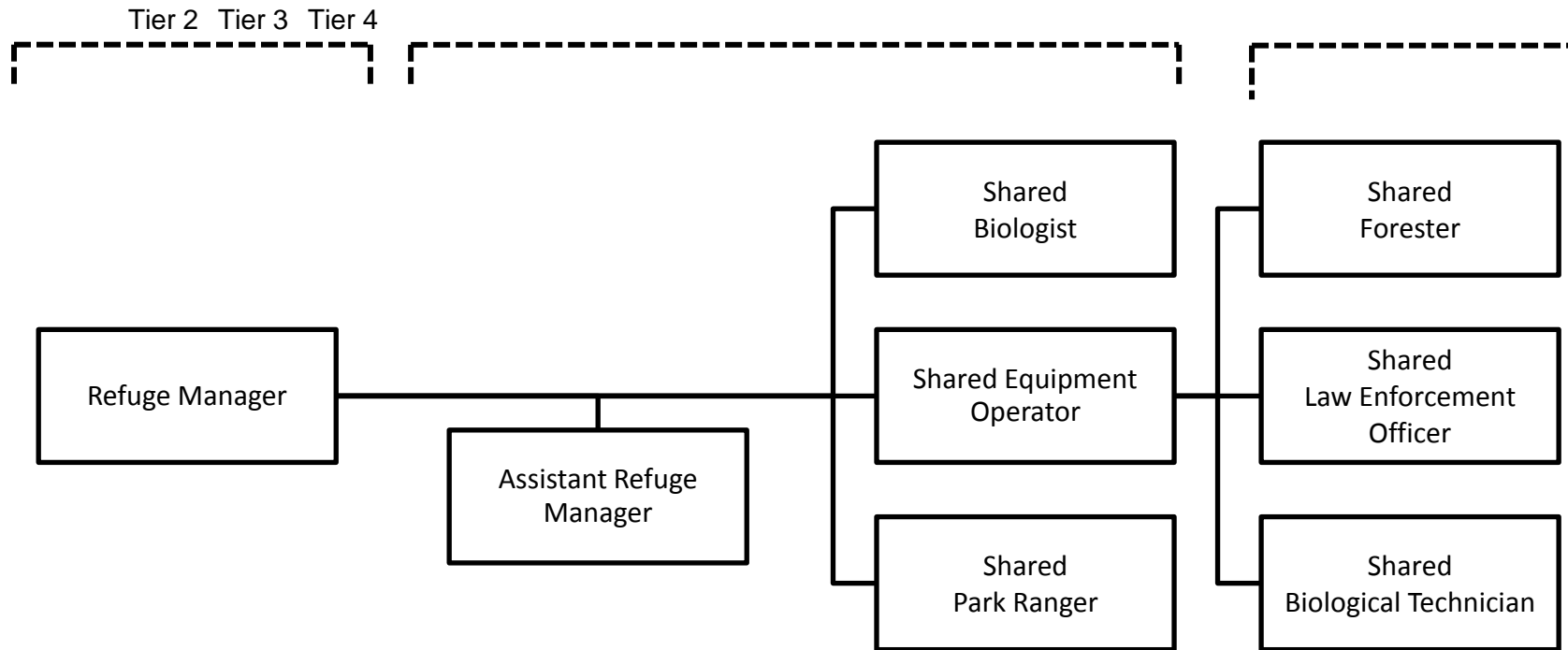
### **Discussion:**

The refuge relies on volunteer support primarily for maintenance. Volunteer support on refuges throughout the country accounts for approximately 25 percent of the work accomplished. Volunteers are an important and vital asset to refuges; however, they need direction and support from staff to efficiently conduct project work and other assigned activities. The refuge manager currently coordinates volunteer projects and activities, but other duties prevent the attention required to sustain a large volunteer core. An additional park ranger would be necessary if a large volunteer core is to be adequately coordinated and supported. The refuge would rely on volunteer support primarily for outreach events, public tours, environmental education, and maintenance.

### **Strategies:**

- Have volunteers assist with repair and maintenance of infrastructure (Tier 2).
- Establish and schedule job responsibilities and duties for volunteers (Tier 2).
- Hire a park ranger (public use) to develop and coordinate volunteer projects (Tier 3).
- Recruit volunteers using [www.volunteer.gov/gov](http://www.volunteer.gov/gov), Facebook, and local news releases. (Work with Regional Volunteer Coordinator) (Tier 3).
- Develop a volunteer packet or handbook with safety rules, work assignments, FAQ's, etc. (Tier 3).
- Consider assigning volunteer management to the next staff person hired if public use specialist has not been hired. This person should attend the next volunteer training offered at NCTC, work with entire staff to establish work assignments, etc. (Tier 3).
- Establish an Americorp team or hire YCC to complete refuge work duties (Tier 4).

Figure 13. Staffing Chart for Cahaba River NWR



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## 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 Draft CCP/EA for Cahaba River NWR, this section identifies projects, funding and personnel needs, volunteers, partnership opportunities, step-down management plans, a monitoring and adaptive management plan, and plan review and revision.

### PROPOSED PROJECTS

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

#### *FISH AND WILDLIFE POPULATION MANAGEMENT*

**1. Provide a Wildlife Biologist to conduct essential biological activities relative to wildlife and habitat management:** Develop a professional science-driven biological program at Cahaba River NWR to achieve wildlife and habitat conservation goals identified in the refuge's comprehensive conservation and habitat management plans, state conservation plans, and that contribute to the Service mission. Program development requires the addition of a shared full-time wildlife biologist position to ensure program success and integrity. Responsibilities include coordinating with conservation partners, assessing current refuge biological conditions through surveys and research, planning, implementation of wildlife and habitat initiatives, and applicable monitoring. Position contributions would serve to meet local and regional conservation objectives and goals, but also serve as a catalyst to attain landscape goals related to the Service's SHC initiative, climate change initiative, and/or other national or global conservation pursuits.  
(Linkages: Objectives 1.2, 1.3, 2.2, 2.9, 2.11, 2.12, 2.13, 3.1, 3.2, 3.5, 3.6, 3.8, 5.1, 5.2, 5.3)

Recurring Costs: \$93,000; Special Project Cost: \$93,000

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**2. Improve Biological Support (Biological Technician):** Currently Cahaba River NWR is being heavily used by the public for recreational purposes. By adding a biological technician to the staff, the refuge would be able to improve severely degraded habitat, increase the presence of native wildlife, and decrease unauthorized public uses of these lands. The biological technician would better enable sound science-based management decision-making.  
(Linkages: Objectives 1.3, 2.13, 3.4, 3.8)

Recurring Costs: \$62,000; Special Project Cost: \$62,000

**3. Conduct Critical Wildlife Surveys:** Science-based inventorying and monitoring of wildlife and plant species populations are critical to ensuring the biological integrity of the refuge. This project would standardize protocols to be conducted determining presence and distribution of priority species and to provide baseline data to assist managers in habitat management practices. Included in these efforts would be the development of partnerships to assist in monitoring efforts on the refuge. The information collected would serve as the basis for developing habitat management plans and would influence all refuge management activities. A systematic inventorying and monitoring program would enable the refuge to make informed management decisions and valuable long-term contributions to national and regional objectives for threatened and endangered aquatic species including mussels, snails, and fish, as well as native migratory and resident birds, reptiles, and amphibians, and species of special concern. Standardized census and survey techniques would be employed and all data compiled into databases, including GIS, for spatial analysis. This information is critical to formulating management actions and evaluating longleaf pine restoration and management, invasive species control, and other refuge programs. All data would be shared with appropriate state and federal partners in an effort to advance landscape management.  
(Linkages: Objectives 1.2, 2.1, 2.2, 2.3, 2.8, 2.13, 3.1, 3.2, 3.6, 3.7, 5.1, 5.2, and 5.5).

Recurring Costs: \$25,000; Special Project Cost: \$100,000

**4. Control Exotic, Invasive, and Nuisance Wildlife Species:** This project would provide information on the expansion of animals that are considered potential threats to the Cahaba River NWR. By monitoring the movement and spread of such, effective wildlife management resources and treatments would be employed on the refuge. Invasive species directly compete with native species, reducing habitat carrying capacity, adversely affecting wildlife reproduction and/or recruitment, and having the capacity to completely alter plant communities within an area or region. Nuisance species can also have significant negative impacts through real or perceived negative impacts on native plants and animals and require attention to ensure activities do not compromise priority management objectives or refuge programs. Control of invasive and nuisance species on the refuge would be conducted by staff using various control techniques or through professional damage control personnel to supplement the refuge staff's invasive/nuisance control efforts.  
(Linkage: Objective 3.8)

Recurring Costs: \$5,000; Special Project Cost: \$50,000

**5. Invasive Plant Species Control:** Control invasive, exotic plants such as Chinese privet, *Mimosa*, kudzu, alligator weed, and other species infesting Cahaba River NWR on approximately 1,000 acres. The refuge's biological integrity is threatened by a variety of invasive plant species. This project would provide for range expansion monitoring and help to develop and implement an integrated pest management (IPM) program to control invasive plants. Invasive plant occurrence would be mapped and quantified with appropriate IPM strategies applied to control invasive plant species. Management actions would be taken by refuge staff (permanent and temporary) and would include hand removal, herbicide application, site preparation, and native vegetation replanting in order to restore native flora.



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Once controlled, annual spot treatments would be conducted by permanent staff as needed to prevent re-colonization of sites.

(Linkages: Objectives 1.3 and 2.13).

Recurring Costs: \$10,000; Special Project Cost: \$150,000

**6. Reintroduce listed aquatic species:** Several federal, state, and nonprofit organizations are breeding listed snails, mussels, and fish for the purposes of reintroduction. Many species have been found to be extirpated from the refuge or their host fishes are not able to reach breeding mussels to continue the reproductive cycle. Therefore, reintroductions are necessary to reestablish populations within the historic range. The refuge would assist these efforts on the Cahaba or Little Cahaba rivers by providing information on favorable habitats that may be considered as restocking sites.

(Linkages: Objectives 3.1 and 3.2)

Recurring Costs: \$35,000; Special Project Cost: \$125,000

#### *HABITAT MANAGEMENT*

**7. Wildlife and Habitat Geospatial Analysis:** Increase capability and capacity for Geospatial analysis on wildlife and habitat management. This project would acquire necessary equipment and software in order to process data, develop an up-to-date data management system, obtain spatial information from appropriate sources, conduct geospatial analyses, and maintain databases.

Included in this project is the hiring of a term GIS specialist and associated training for refuge staff.

(Linkages: Objectives 2.3, 2.9, 2.11, 2.12, 2.13 and 5.5)

Recurring Costs: \$75,000; Special Project Cost: \$90,000

**8. Restore longleaf pine and enhance forest management capability to obtain and sustain desired forest conditions:** Develop a professional science-driven forestry program to improve forest conditions on approximately 2,000 acres of refuge lands to meet habitat conditions identified as critical for the management of migratory birds and longleaf pine forest conservation on Cahaba River NWR. Program development requires the addition of a full-time, shared forester position to ensure program success and integrity. Historically, the uplands of Cahaba River NWR were dominated by longleaf pine. Logging, fire suppression, coal mining, and other land uses have substantially reduced this habitat type. Currently, over half of the refuge would be able to support longleaf pine. To restore the ecological integrity of the longleaf pine system and to create habitat conditions necessary for pine-dependent species, forest management is needed. Historic fire exclusion has encouraged various hardwood tree species to become dominant on refuge forests. Elements to achieve desired conditions would require the use of qualified forestry professionals to inventory existing stands, provide recommendations, prepare prescription/planning documents, and administer approved improvement actions. Pre- and post-monitoring of migratory bird use, forest reproduction, and vigor would be conducted to ensure that objectives of forest health and structure are achieved.

Achievement of desired forest conditions would promote efforts to accomplish goals set forth in the Longleaf Pine Range-wide Conservation Initiative and benefit wildlife. Partnerships would be instrumental in reaching the desired objectives for longleaf restoration, given refuge neighbors' goals to promote longleaf and quality habitat for native wildlife and plant species.

(Linkages: Objectives 2.3, 2.4, 2.5, 2.6, 2.10, 5.3 and 7.1)

Recurring Costs: \$100,000; Special Project Cost: \$100,000

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**9: Protect Cahaba lily shoals from damage and monitor health of this resource:** Cahaba lily shoals are vulnerable to trampling and boat damage. Increasing use of the river would likely result in more damage to this rare resource. This project aims to inform and educate the public about the potential impacts on the shoals and how these can be minimized. As part of this project, the health of these shoals would be monitored.  
(Linkages: Objectives 1.1 and 1.2)

Recurring Costs: \$10,000; Special Project Cost: \$30,000

#### *RESOURCE PROTECTION*

**10. Increase stakeholder participation and build partnerships to improve water quality:** The water quality of the Cahaba River is primarily influenced by land uses upstream of the refuge. Increased participation in stakeholder initiatives and partnerships would help the refuge understand efforts being taken upstream to improve water quality. This would also give the refuge an opportunity to garner support from other river stakeholders and forge new partnerships.  
(Linkages: Objectives 5.1, 5.2 and 5.3)

Recurring Costs: \$25,000; Special Project Cost: \$50,000

**11. Provide Visitor, Resource, and Facility Protection (Law Enforcement):** Provide one full-time, shared law enforcement officer to protect wildlife, lands, infrastructure, employees, and the general public on Cahaba River NWR. Director's Order No. 155 requires the Service to reduce dependency on dual-function refuge officers and progress towards a full-time officer workforce. This officer would assist in fulfilling these needs by placing an officer in the field full-time to protect wildlife resources. Visitation continues to increase every year and the refuge expects the implementation of the Cahaba River Blueway to magnify this growth. Visitation increases have led to intensification in littering, road and river traffic, vandalism, trespass, and other inappropriate or illegal activities on refuge lands. Protection is the most basic form of wildlife management and this project would dedicate a full-time law enforcement officer to conserve and protect wildlife and habitats, as well as improving visitor safety and services.  
(Linkages: Objectives 4.1 and 6.1).

Recurring Costs: \$93,000; Special Project Cost: \$150,000

**12. Catalog Cultural and Historical Resource Information of the Refuge:** Refuge staff, along with the Regional Archaeologist, would maintain records of the refuge's cultural landscape. As archaeological and cultural resources are newly discovered, refuge staff would coordinate with the regional archaeologist to add them to the catalog and assure appropriate archival. A GIS layer for archaeological and historical sites would be integrated into the refuge's GIS Database. Recurring costs include conservation and protection of identified sites and administrative needs for existing or new sites that are found. This project would also include interpretation and display of pertinent information for the visiting public.  
(Linkage: Objective 5.5.)

Recurring Costs: \$10,000; Special Project Cost: \$35,000

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## *VISITOR SERVICES*

**13. Provide quality refuge visitor services programs:** Develop and implement a professional visitor services program at Cahaba River NWR to provide quality wildlife-dependent recreation and environmental education opportunities at levels commensurate with public demand and available refuge resources. The refuge is recognized as a valuable public resource due to community interest, area tourism, and proximity to more than 50 educational institutions. Existing partnerships, as well as the use of volunteers and temporary employees, have assumed interim program responsibilities of the refuge's visitor services program but cannot keep pace with the growing demand. A trained and dedicated staff person is essential to coordinate efforts, provide direction, and ensure long-term success. Responsibilities would include: planning and implementation of environmental education programs and special events, coordination of volunteers, Friends group, Junior Duck Stamp contest, development and promotion of partnerships, and environmental education grant writing. (Linkages: Objectives 4.3, 4.4 and 4.5).

Recurring Costs: \$93,000; Special Project Cost: \$ 110,000

## *REFUGE ADMINISTRATION*

**14. Improvement of Public Access (Parking Areas, Trails, and Roads):** Public access to the Cahaba River NWR, as well as access for management activities, is limited due to topography. Resolving issues caused by the original road placement of River Trace Road along the Cahaba River, prior to refuge ownership, are a constant maintenance concern and the source of many traffic dilemmas. Significant improvements can be made by providing and improving existing directional/interpretive signage, parking areas, expanding trails, and regular road maintenance. Opportunities to improve access exist throughout the refuge and would benefit all refuge programs and contribute to the public's recreational opportunities and conservation awareness. (Linkages: Objectives 6.2 and 6.3)

Recurring Costs: \$20,000; Special Project Cost: \$ 75,000

**15. Maintain service infrastructure and equipment:** Provide ability to service and maintain refuge equipment and infrastructure valued at more than \$22 million, to ensure all aspects of daily refuge management and significant refuge programs (biological, visitor services, law enforcement) are fully supported. The proper management of government investments in the form of refuge equipment, kiosks, roads, etc., requires the addition of a full-time shared equipment operator. Responsibilities include regular and routine maintenance of all small and heavy equipment, approximately 20 miles of roads and trails, numerous parking areas, signs, kiosks, canoe launches, wildlife observation structures, etc. An equipment operator position would serve all refuge operations and is critical to the continued efficiency and cost management associated with the oversight of public lands at Cahaba River NWR. (Linkages: Objectives 6.2 and 6.3)

Recurring Costs: \$76,000; Special Project Cost: \$76,000

**16. Equipment for Sustained Operations:** Heavy equipment is essential to conduct land management initiatives in support of all refuge programs (e.g., biological, public use and education, law enforcement, and volunteer). Needed equipment includes a 115-145 HP 4x4 tractor with loader (\$80,000), bulldozer (\$175,000), and diesel transport truck and lowboy trailer (\$145,000). Specific work to be supported includes road and trail enhancement, creation and maintenance of firebreaks, as well as other habitat restoration work. (Linkage: Objectives 6.2.)

Recurring Costs: \$10,000; Special Project Cost: \$400,000

**FUNDING AND PERSONNEL**

**Table 21. Summary of projects**

PROJECT NUMBER	PROJECT TITLE	FIRST YEAR COST	RECURRING ANNUAL COST	STAFF (FTE'S)	GOAL/OBJECTIVE LINKAGE
1	Provide Wildlife Biologist to conduct essential biological activities relative to wildlife and habitat management	\$93,000	\$93,000	0.75	1.2, 1.3, 2.2, 2.9, 2.11, 2.12, 2.13, 3.1, 3.2, 3.5, 3.6, 3.8, 5.1, 5.2, 5.3
2	Improve Biological Support	\$62,000	\$62,000	0.75	1.3, 2.13, 3.4, 3.8
3	Conduct Critical Wildlife Surveys	\$100,000	\$25,000	0.5	1.2, 2.1, 2.2, 2.3, 2.8, 2.13, 3.1, 3.2, 3.6, 3.7, 5.1, 5.2, 5.5
4	Control Exotic, Invasive, and Nuisance Wildlife Species	\$50,000	\$5,000	0.25	3.8
5	Invasive Plant Species Control	\$150,000	\$15,000	1	1.3, 2.13
6	Reintroduce Listed Aquatic Species	\$25,000	\$15,000	0.25	3.1, 3.2
7	Wildlife and Habitat Geospatial Analysis	\$90,000	\$75,000	1 (Contract or term)	2.3, 2.9, 2.11, 2.12, 2.13, 5.5
8	Restore Longleaf Pine and Enhance Forest Management Capability to Obtain and Sustain Desired Forest Conditions	\$100,000	\$100,000	1	2.3, 2.4, 2.5, 2.6, 2.10, 5.3, 7.1

PROJECT NUMBER	PROJECT TITLE	FIRST YEAR COST	RECURRING ANNUAL COST	STAFF (FTE'S)	GOAL/OBJECTIVE LINKAGE
9	Protect Cahaba Lily Shoals From Damage and Monitor Health	\$30,000	\$10,000	0.25	1.1, 1.2
10	Increase Stakeholder Participation and Build Partnerships to Improve Water Quality	\$50,000	\$10,000	0.5	5.1, 5.2, 5.3
11	Provide Visitor, Resource, and Facility Protection	\$150,000	\$93,000	1	4.1, 6.1
12	Catalog Cultural and Historical Resource Information of the Refuge	\$35,000	\$10,000	0.25	5.5
13	Provide Quality Refuge Visitor Services Programs	\$110,000	\$93,000	0.75	4.3, 4.4, 4.5
14	Improvement of Public Access	\$75,000	\$20,000	0.25	6.2, 6.3
15	Maintain Service Infrastructure and Equipment	\$76,000	\$76,000	0.5	6.2, 6.3
16	Equipment for Sustained Operations	\$400,000	\$10,000		6.2
<b>Total staff</b>			-	<b>8</b>	-

## PARTNERSHIP/VOLUNTEERS OPPORTUNITIES

A key element of this Draft CCP/EA is to establish partnerships with local volunteers, landowners, private organizations, and state and federal natural resource agencies. In the immediate vicinity of the refuge, opportunities exist to enhance or establish partnerships with neighboring landowners, the Alabama Aquatic Biodiversity Center, The Nature Conservancy, and state agencies.

## STEP-DOWN MANAGEMENT PLANS

A comprehensive conservation plan is a strategic plan that guides the direction of the refuge. A step-down management plan provides specific guidance on activities, such as habitat, fire, and visitor services. These plans (Table 22) are also developed in accordance with the National Environmental Policy Act, which requires the identification and evaluation of alternatives and public review and involvement prior to their implementation.

**Table 22. Cahaba River NWR step-down management plans related to the goals and objectives of the Draft CCP**

Step-down Plan	Completion Date
Habitat Management Plan	2016
Visitor Services Plan	2017
Fire Management Plan	2014
Integrated Pest Management Plan	2017

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

### **PLAN REVIEW AND REVISION**

The Final CCP would be reviewed annually as the refuge’s annual work plans and budgets are developed. It would also be reviewed to determine the need for revision. A revision would occur if and when conditions change or significant information becomes available, such as a change in ecological conditions or a major refuge expansion. The Final CCP would 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 Final CCP and the step-down management plans would be subject to public review and NEPA compliance.

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## **SECTION B. ENVIRONMENTAL ASSESSMENT**

### *I. Background*

#### **INTRODUCTION**

The Service prepared this Environmental Assessment (EA) for Cahaba River NWR in compliance with the National Environmental Policy Act (NEPA) and the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act). The Improvement Act requires the development of comprehensive conservation plans for all refuges. Following a public review and comment period on the Draft CCP/EA, a final decision would be made by the Service that would guide refuge management actions and decisions over the next 15 years, provide understanding about the refuge and management activities, and incorporate information and suggestions from the public and refuge partners.

This Draft CCP/EA proposes a management direction, which is described in detail through a set of goals, objectives, and strategies. The Draft CCP/EA addresses current management issues, provides long-term management direction and guidance for the refuge, and satisfies the legislative mandates of the Improvement Act. While the Draft CCP provides general management direction, subsequent step-down plans would provide more detailed management direction and actions.

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

#### **PURPOSE AND NEED FOR ACTION**

The purpose is to develop a Final CCP to ensure that Cahaba River NWR (a) contributes to the conservation, enhancement, and restoration of native aquatic habitats; (b) conserves, enhances, and restores longleaf pine forests and other native terrestrial habitats; (c) conserves, manages, and restores populations of native animal species; (d) helps maintain and assist in the recovery of federally listed species; (e) offers opportunities for environmental education, interpretation, and wildlife-dependent recreation; (f) promotes public awareness; and (g) protects biological and cultural resources and refuge infrastructure.

This EA addresses the need to adopt a 15-year management plan based on the proposed action for the Cahaba River NWR that provides guidance for future refuge management and meets the requirements of the Improvement Act; that evaluates the compatibility of public uses; and that protects biological integrity, diversity, and environmental health.

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## **DECISION FRAMEWORK**

Based on the assessment described in this EA, the Service will select an alternative to implement the Final CCP for Cahaba River NWR. The Final CCP will likely include a FONSI, which is a statement explaining why the selected alternative will not have a significant effect on the quality of the human environment. This determination is based on an evaluation of the Service and Refuge System mission, the purpose(s) for which the refuge was established, and other legal mandates. Assuming no significant impact is found, implementation of the Final CCP will begin and will be monitored annually and revised when necessary.

## **PLANNING STUDY AREA**

The refuge is located near the town of West Blocton in Bibb County, Alabama. The city of Birmingham is located about 30 miles to the northeast, while Montgomery is 65 miles to the southeast. The 3,681-acre refuge was legislatively established on September 25, 2002, on former private and commercial timberlands bordering the Cahaba River. Approximately three miles of the Cahaba River flow through the refuge.

The Cahaba River is Alabama's longest free-flowing river, with a watershed of 1,825 square miles. Free-flowing streams and rivers are considered an endangered habitat type due to damming for hydroelectric production and transportation. This 190-mile-long river extends from its source near Trussville in St. Clair County, south to the Alabama River. The Cahaba River and its major tributaries support one of the most diverse aquatic ecosystems in the United States.

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

## **AUTHORITY, LEGAL COMPLIANCE, AND COMPATIBILITY**

The Service developed this Draft CCP/EA in compliance with the Improvement Act and Part 602 of the Fish and Wildlife Service Manual (National Wildlife Refuge System Planning). The actions described within this Draft CCP/EA also meet the requirements of NEPA (1969). The refuge staff achieved compliance with NEPA through the involvement of the public and the incorporation of this EA in the document, with a description of the alternatives considered and an analysis of the environmental consequences of the alternatives (Chapters III and IV in this section). When fully implemented, the Final CCP will strive to achieve the vision and purposes of Cahaba River NWR.

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

### *COMPATIBILITY*

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



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Refuge System or the purposes of the refuge.” In addition, “wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety.”

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

## **PUBLIC INVOLVEMENT AND THE PLANNING PROCESS**

In accordance with Service guidelines and NEPA recommendations, public involvement has been a crucial factor throughout the development of the Draft CCP/EA for Cahaba River NWR. This Draft CCP/EA has been written with input and assistance from interested citizens, conservation organizations, and employees of local and state agencies. The participation of these stakeholders and their ideas has been of great value in setting the management direction for Cahaba River 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 planning process began in October 2011, with various data-gathering sessions. As part of that process, the Service reviewed approved step-down plans, a visitor services review, GIS data, species’ lists, and other information pertinent to the development of a CCP.

An intergovernmental scoping meeting was held on May 8, 2012 at Tannehill Ironworks State Park. In addition to various tribes, several federal, state, and local agencies were invited. A total of 13 people, including Service staff, participated. The purpose of the meeting was to develop a list of issues and opportunities to be addressed in the Draft CCP/EA.

On February 26, 2013, a public scoping meeting was held at the Cahaba Lily Center in West Blocton. The meeting was announced via several local media outlets, the refuge website, and social media site. Approximately 10 people attended.

A complete summary of the issues and concerns is provided in Appendix D, Public Involvement - Summary of Public Scoping Comments.



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## *II. Affected Environment*

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



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### *III. Description of Alternatives*

#### **FORMULATION OF ALTERNATIVES**

Alternatives are different approaches or combinations of management objectives and strategies designed to achieve the refuge's purpose and vision, and the goals identified in the Draft CCP; support the mission of the Appalachian Landscape Conservation Cooperative; the goals of the Refuge System; and the mission of the Service. Alternatives are formulated to address the significant issues, concerns, and problems identified by the Service and the public during public scoping.

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

Over the course of the Region's first round of CCPs, it became apparent that staffing and funding scenarios, as well as plan objectives and strategies, did not reflect realistic changes within a 15-year time span. Too often, they reflected an ideal situation to ultimately fulfill the purpose of the refuge within that time span. To address this issue, we used a tiered approach to strategically develop our objectives and strategies recognizing priorities, and a variety of potential accomplishment scenarios under varying funding conditions.

As we are currently facing budget reductions within the Refuge System, the need for tiering is even greater, not only to reflect what each refuge is currently accomplishing and could accomplish with additional resources, but to more importantly provide realistic expectations of the accomplishments and priority decisions refuges will face as budget reductions are realized.

Tiering of objectives and strategies in CCPs is accomplished by developing a range of goals, objectives, and strategies reflecting the purpose and vision of the refuge, then strategically identifying a set of appropriate tiering criteria. Finally, the priority of each objective and strategy is determined to provide placement based on each tiering scenario.

The tiering criterion is different for each refuge as it reflects reasonable projections for that particular unit based not only on purpose, vision, and biological needs, but also on potential resources (funding and personnel) over the next 15 years. By providing a range of tiering scenarios, accomplishments can better reflect the resources at hand based on the tier that most accurately displays the actual funding situation over the span of the CCP.

To provide a more realistic expectation of accomplishments over the span of the 15-year CCP, we are utilizing a tiered approach which ties plan objectives to an array of possible scenarios for resource and budget growth. These tiers are as follows:

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- Tier 1: Refuge remains unfunded and the complex loses the one employee, moving the refuge into “stewardship” status, managed minimally by staff from the Wheeler NWR Complex.
- Tier 2: Refuge remains unfunded and all resource protection and enhancement activities are funded by the Mountain Longleaf NWR Complex budget. Staffing levels remain static at one employee for the refuge complex, spending approximately 35 percent of staff time on the resource needs of Cahaba River NWR.
- Tier 3: Refuge complex funding is increased by 10 percent, allowing more funding to be used toward resource, maintenance, and public use projects on Cahaba River NWR. Complex staffing levels are increased to three full-time employees, spending approximately 35 percent of staff time on the resource needs of Cahaba River NWR.
- Tier 4: Refuge complex funding is increased by 20 percent, allowing more funding to be used toward resource, maintenance, and public use projects on Cahaba River NWR. Complex staffing levels are increased to six full-time employees, spending approximately 35 percent of staff time on the resource needs of Cahaba River NWR.

The proposed alternative reflects this tier approach, which is incorporated in the Draft CCP’s objectives and strategies. A summary of the three alternatives is provided in Table 23.

## **DESCRIPTION OF ALTERNATIVES**

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

### *ALTERNATIVE A - (CURRENT MANAGEMENT)*

#### **Wildlife and Habitat Management**

##### *Aquatic Habitats*

Under this alternative, there would be no management of riverine and Cahaba lily/water willow shoals habitats. In addition, exotic aquatic plants and Beaver Pond would not be managed.

##### *Terrestrial Habitats*

Under this alternative, there would be no management of the following habitats: beech, oak, laurel and azalea forest; Cahaba riverwash herbaceous vegetation; canebrake; oak, beech, and sedge forest; oak, hickory, and iris forest; oak, holly, and sparkleberry forest; and tuliptree and sensitive fern forest. For interior longleaf pine woodland and longleaf pine plantations, prescribed fire would be applied to approximately 250 acres every few years to help reduce encroachment of hardwoods and support a more diverse groundcover. There would be no management of planted loblolly pine stands to restore to longleaf pine historically found in the watershed, or management of invasive or exotic species within the refuge boundaries.

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For Georgia aster, genetic and population monitoring by Atlanta Botanical Garden was conducted in 2012 and would continue. Ecological Services would monitor and provide recommendations for management opportunities for Georgia rockcress or glades; however, there would be no management implemented.

### *Wildlife*

Under this alternative, there would be no management of federally listed fish, mussels, and snails, with the exception of management via communication and education with local landowners about sedimentation and nutrient loading of aquatic habitats, and providing sediment control through regular road maintenance of River Trace Road. Additionally, we would coordinate access to potential aquatic animal release sites by the state or other partners for reintroduction purposes.

With the exception of occasional surveys and periodic management activities in select pine-dominated forest stands, no additional management would likely be conducted for migratory birds. The most recent survey for neotropical migratory birds was conducted in 2010.

For the endangered gray bat, surveys would be conducted sporadically. Baseline surveys were carried out during 2007-2009.

No surrogate species have been identified at this time for the Appalachian LCC. Any management for surrogate species that may be identified for the refuge would likely only include what is described above under the various habitat types.

## **Visitor Services**

### *Hunting*

Generally, Cahaba River WMA regulations are followed with some exceptions such as deer bow hunting only on refuge. No additional opportunities for hunting would be evaluated or provided under this alternative.

### *Fishing*

State fishing regulations apply on the refuge, including night fishing and bank fishing. Under this alternative, no additional fishing opportunities would be evaluated or provided.

### *Wildlife Observation and Photography*

Currently, the refuge offers several opportunities for wildlife observation and photography. There are about 6.7 miles of trails, two overlooks, and River Trace Road.

### *Environmental Education*

Under this alternative, no environmental education programs would be offered by the refuge other than continued participation in the annual Forestry Awareness Week Now.

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### *Interpretation*

Under this alternative, some interpretive efforts in conjunction with Cahaba Lily Day, Cahaba River Ramble, Renew Our Rivers, and Cahaba River Society-led canoe trips would likely continue. During these events, partners would make refuge media materials available to the public and/or the refuge would staff a refuge booth. Interpretive signs such as those along Piper Trail and River Trace Road would be maintained and periodically updated.

### *Other Public Uses*

Canoeing and kayaking occur on the refuge. Although many people launch their boats upstream of the refuge, a concrete basin is available for use when launching canoes/kayaks at higher water levels. Were this structure to be damaged by a flood, it would not be replaced under this alternative. Several other areas along River Trace Road are used by people to walk their canoes/kayaks down to the water. Bicycle riding on roads open to vehicles would probably continue to be allowed.

## **Resource Protection**

### *Water Resources*

Under this alternative, several water resource management activities would likely continue. Currently, four water quality monitoring points are sampled quarterly (testing for heavy metals) as part of mine reclamation efforts. Testing would occur from 2013 through 2015. A contaminant assessment and water resource inventory assessment were completed in early 2014. These inventories help to better understand the refuge's hydrology and water availability as well as prioritize management efforts at maintaining these resources.

### *Land Protection*

In terms of protecting lands, the refuge would continue to explore conservation options with only willing landowners within acquisition boundary as funding and opportunities arise. These could include fee-title purchases or less-than-fee-title options, such as easements purchases, management agreements, etc.

### *Cultural Resources*

There would be no management for cultural resources under this alternative. Currently, there are no known cultural resources, and a comprehensive assessment would probably not be conducted. However, if sites are identified, the refuge would ensure cultural resource management and protection strategies are implemented.

## **Refuge Administration**

### *Staffing*

Under this alternative, the refuge manager would continue to be stationed in Anniston, Alabama, with oversight duties also including Mountain Longleaf and Watercress Darter NWRs. A deputy manager position would likely not be filled. The zone officer would continue to conduct periodic law enforcement patrols and respond to reported incidents on the refuge.



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### *Infrastructure*

On an as-needed basis, work crews from Wheeler NWR and possibly other refuges would periodically maintain and repair roads and unpaved parking areas, replace culverts, and maintain boundary markers. The refuge would solicit the help of volunteers to assist with maintenance of trails and repairing benches, etc.

### *Facilities*

No facilities would be built on or near the refuge under this alternative.

### **Volunteers and Other Partnerships**

Under this alternative, the refuge would continue relationships with current partners to expand the refuge's capacity to protect and monitor biological resources, implement habitat improvement projects, enhance interaction and education of refuge visitors through on- and off-site events and encourage cooperative programs with academic institutions and non-governmental organizations.

The refuge currently has several active volunteers that help pick up trash along refuge roads and County Road 24, and maintain trails. Under the current alternative, these volunteer activities would likely continue.

### ***ALTERNATIVE B – EXPAND HABITAT AND WILDLIFE MANAGEMENT (PROPOSED ALTERNATIVE)***

The following activities are in addition to Alternative A.

### **Wildlife and Habitat Management**

#### *Aquatic Habitats*

Under this alternative, management for riverine habitat and Beaver Pond would be the same as for Alternative A. With regards to Cahaba lily/water willow shoals, the refuge would monitor the health and distribution of the Cahaba Lily population and work to educate the public about the fragility of these habitats to human disturbance. The refuge would chemically control alligator weed on an annual basis.

#### *Terrestrial Habitats*

Under this alternative, we would re-inventory and create maps for the following habitats: beech, oak, laurel and azalea forest; Cahaba riverwash herbaceous vegetation; canebrake; oak, beech and sedge forest; oak, hickory, and iris forest; oak, holly, and sparkleberry forest; and tuliptree and sensitive fern forest. The refuge would work to reestablish viable canebrake communities. We would update and implement the habitat management plan. For interior longleaf pine woodland, loblolly pine plantation, and longleaf pine plantation we would designate stand conditions for restoration purposes and reestablish a recurring fire regime. Surveys would be conducted to determine if glade habitat exists within the refuge boundary. The refuge would implement control measures and monitoring of invasive plant species (*Chinese Privet*, *Alligator Weed*, *Kudzu*, *Mimosa*, etc.) as appropriate.

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For Georgia aster, we would work with partners to conduct additional surveys and create a GIS database to map Georgia aster distribution. We would work with partners to continue surveys for Georgia rockcress and implement management strategies (including timber management and invasive species removal) to increase population size and the number of locations.

### *Wildlife*

Within this alternative, we would develop an educational program and evaluate overutilization of recreation on the refuge, and we would restore stream habitat that potentially impacts federally listed mussels, snails, and fish. We would also work with partners to identify and provide access for reintroductions of these species.

For neotropical migratory birds, we would resume biotic inventories utilizing refuge staff, local universities, and partners. Habitats would be restored for focal species where appropriate. In addition, use of prescribed fire would be utilized to improve conditions for focal species that are dependent upon pine-dominated habitats.

Inventory and monitor for gray bats, bald eagles, and other surrogate species.

### **Visitor Services**

#### *Hunting*

Under this alternative, existing hunting regulations would continue.

#### *Fishing*

Fishing opportunities would remain the same as under Alternative A.

#### *Wildlife Observation and Photography*

In addition to the current infrastructure available to support these uses, we would work with partners to possibly add benches to the overlooks, provide trail distance markers, signage and view scopes along Piper Trail, design refuge trail brochures, develop an auto tour, construct a walking bridge over Caffee Creek, and implement a shuttle system during peak lily season.

#### *Environmental Education*

Under this alternative, we would work with partners to develop, expand, and present educational programs that emphasize the importance of wildlife habitat and population management to elementary schools in Bibb County and local scouting groups. We would work with local universities to provide an outdoor classroom setting for environmental education.

#### *Interpretation*

In addition to Alternative A, we would increase opportunities for interpretation by adding a kiosk to the trail off River Trace Road and additional interpretive signs across the refuge, authoring interpretive brochures, creating a video field trip, and developing an auto tour app and a virtual geocache activity.

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### *Other Public Uses*

Under this alternative, we would maintain bicycle riding opportunities and the current launch site for canoeing and kayaking.

### **Resource Protection**

#### *Water Resources*

In addition to Alternative A, we would:

- participate as stakeholder on regional water quality improvement efforts within the upper Cahaba Basin;
- work to improve water quality of refuge tributary streams through partnerships with adjacent landowners;
- establish cooperative programs and partnerships with the University of Alabama for lands along the western refuge boundary; and
- install a stream gage within the refuge boundary.

#### *Land Protection*

In addition to Alternative A, we would work with partners to identify and provide assistance to landowners to conserve priority lands within the Cahaba River watershed whereby providing long-term protection of valued resources within the watershed.

#### *Cultural resources*

Under this alternative, we would work with the Regional Archaeologist to complete a comprehensive historical and archaeological resource survey on current refuge lands and any additional lands acquired.

### **Refuge Administration**

#### *Staffing*

Under this alternative, seven additional complex staff would be needed to carry out the proposed projects. These positions include: an assistant refuge manager, biologist, equipment operator, park ranger, forester, law enforcement officer, and biological technician.

#### *Infrastructure*

In addition to Alternative A, we would:

- improve River Trace Road (e.g., install low water crossings and culverts, improve road surface, etc.),
- protect the River Trace Road from erosion (undercutting by river), and
- improve Belcher Road through regular maintenance.

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### *Facilities*

- No facilities would be built on or near the refuge; however, a new complex office and maintenance shop would be constructed in Anniston. This complex office would provide support to the refuge over the life of the CCP.

### **Volunteers and Other Partnerships**

- In addition to Alternative A, we would train volunteers to conduct interpretive programs (emphasizing the need for wildlife and habitat and wildlife management) and implement projects (interpretive signs, invasive species control, biological monitoring, etc.). Expand the volunteer program to include an Americorp team.

### *ALTERNATIVE C - EMPHASIZE NATURAL AND PRIMITIVE PROCESSES*

#### *Aquatic Habitats*

Under this alternative, management of riverine and Cahaba lily/water willow shoals habitats would remain the same as Alternative A. For Beaver Pond, we would evaluate feasibility for restoring its natural hydrology.

#### *Terrestrial Habitats*

Under this alternative, there would be no change in management for the following habitats: beech, oak, laurel, and azalea forest; Cahaba riverwash herbaceous vegetation; canebrake; oak, beech, and sedge forest; oak, hickory, and iris forest; oak, holly, and sparkleberry forest; and tuliptree and sensitive fern forest. We would replace planted loblolly pine plantation stands with longleaf pine, on an opportunistic basis. For interior longleaf pine woodland and longleaf pine plantation, we would use prescribed fire only to minimize threat of wildfire. There would be no surveys conducted for glades.

Management of Georgia rockcress would be the same as under Alternative A. There would be no active management for Georgia aster.

#### *Wildlife*

Management for federally listed aquatic species, neotropical migratory birds, gray bat, bald eagle, and other surrogate species would be the same as under Alternative B.

### **Visitor Services**

#### *Hunting*

Hunting opportunities would be the same as Alternative A.

#### *Fishing*

Under this alternative, River Trace Road would be closed to motor vehicles and converted to a trail.

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### *Wildlife Observation and Photography*

Within this alternative, wildlife observation and photography opportunities would be the same as Alternative A, but River Trace Road would be converted to a trail.

### *Environmental Education*

Under this alternative, we would work with partners to develop and present educational programs that emphasize the role of natural ecological processes in shaping wildlife habitats.

### *Interpretation*

We would develop interpretive materials and messages that emphasize the role of natural and primitive processes in shaping wildlife habitats.

### *Other Public Uses*

Under this alternative, we would remove the concrete basin that is used to launch canoes and kayaks. In addition, we would convert River Trace Road to a trail and evaluate if it would remain open to bicycle riding.

## **Resource Protection**

### *Water Resources*

For water quality, management would be similar to Alternative B, but we would also ensure that mine tailings do not contaminate groundwater through removal or other means. We would restore the natural hydrology on the refuge in areas where there is the greatest need.

### *Land Protection*

Under this alternative, land protection efforts would focus on tracts within the acquisition boundary based on their potential role in creating a more connected and functional ecosystem.

### *Cultural resources*

Cultural resources would be managed the same as Alternative A.

## **Refuge Administration**

### *Staffing*

Under this alternative, the following three additional staff would be required: biologist, biological technician, and equipment operator.

### *Infrastructure*

Within this alternative, we would convert River Trace Road to a trail. We would also evaluate which road-side ditches and culverts would need to be altered to restore the former hydrology and reduce sedimentation.

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### *Facilities*

No facilities would be leased, acquired, or built under this alternative.

### **Volunteers and Other Partnerships**

In addition to Alternative A, we would offer our volunteers training to conduct interpretive programs that emphasize the role of natural and primitive processes in shaping wildlife habitat.

### **FEATURES COMMON TO ALL ALTERNATIVES**

Although the alternatives differ in many ways, there are similarities among them as well. These common features are listed below to reduce the length and redundancy of the individual alternative descriptions.

#### *MANAGEMENT COMMON TO ALL ALTERNATIVES*

Several elements of refuge management are common to all of the alternatives. All management activities that could impact natural resources, including subsurface mineral reservations, utility lines and easements, soil, water, air, contaminants, and archaeological and historical resources would be managed to comply with all applicable laws, regulations, and policies. All alternatives are subject to all applicable future permit requirements. Individual projects may require additional consultation with the Service's Regional Archaeologist and the State of Alabama Historic Preservation Office. Additional consultation, surveys, and clearance may be required where project development would be conducted on the refuge or when activities would affect properties eligible for the National Historic Register.

#### *ENVIRONMENTAL JUSTICE*

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities' access to public information and participation in matters relating to human health or the environment. This EA has not identified any adverse or beneficial effects for any alternative unique to minority or low-income populations in the affected area. None of the alternatives would disproportionately place any adverse environmental, economic, social, nor health impacts on minority or low-income populations.

**COMPARISON OF THE ALTERNATIVES BY ISSUE**

**Table 23. Comparison of alternatives by management issues for Cahaba River NWR**

<i>KEY TOPICS</i>	<b>Alternative A - Current Management (No Action Alternative)</b>	<b>Alternative B - Expand Habitat and Wildlife Management (Proposed Alternative)</b>	<b>Alternative C - Emphasize Natural and Primitive Processes</b>
<b>Wildlife and Habitat Management</b>			
<b>Goal 1:</b> Contribute to the conservation, enhancement, and restoration of native aquatic habitats of the Cahaba River to help maintain and assist in the recovery of federally listed species and to support native plants and animals.			
<b>Riverine habitat</b>	No active management.	Same as Alternative A.	Same as Alternative A.
<b>Cahaba lily/water willow shoals</b>	No active management.	Educate public about the fragility of these habitats to human disturbance. Monitor health and distribution of these shoals. Control alligatorweed.	Same as Alternative A.
<b>Beaver Pond</b>	No active management.	Same as Alternative A.	Evaluate feasibility for restoring natural hydrology.
<b>Goal 2:</b> Conserve, enhance, and restore native terrestrial habitats of the refuge to maintain and assist in the recovery of federally listed species and to support native plants and animals.			
<b>Beech, oak, laurel and azalea forest</b>	No active management.	Inventory and map habitat.	Same as Alternative A.
<b>Cahaba riverwash herbaceous vegetation</b>	No active management.	Inventory and map habitat.	Same as Alternative A.
<b>Canebrake</b>	No active management.	Inventory and map habitat.	Same as Alternative A.
<b>Interior longleaf pine woodland</b>	Prescribed fire (TBD year and acres)	Inventory and map habitat. Designate stand conditions for restoration purposes and reestablish a recurring fire regime	Same as Alternative A.

<b>KEY TOPICS</b>	<b>Alternative A - Current Management (No Action Alternative)</b>	<b>Alternative B - Expand Habitat and Wildlife Management (Proposed Alternative)</b>	<b>Alternative C - Emphasize Natural and Primitive Processes</b>
<b>Loblolly pine plantation</b>	Working on prescriptions commercial thinning.	Inventory and map habitat. Designate stand conditions for restoration purposes and reestablish a recurring fire regime	Same as Alternative A. .
<b>Longleaf pine plantation</b>	Prescribed fire (TBD year and acres)	Inventory and map habitat. Designate stand conditions for restoration purposes and reestablish a recurring fire regime.	Use prescribed fire only to minimize threat of wildfire.
<b>Oak, beech and sedge forest</b>	No active management.	Inventory and map habitat.	Same as Alternative A.
<b>Oak, hickory, and iris forest</b>	No active management.	Inventory and map habitat.	Same as Alternative A.
<b>Oak, holly, and sparkleberry forest</b>	No active management.	Inventory and map habitat.	Same as Alternative A.
<b>Tuliptree and sensitive fern forest</b>	No active management.	Inventory and map habitat.	Same as Alternative A.
<b>Georgia aster</b>	2012 genetic monitoring by Atlanta Botanical Garden	Work with partners to conduct surveys.	No active management.
<b>Georgia rockcress</b>	No active management.	Work with partners to conduct surveys.	Same as Alternative A.
<b>Glades</b>	Not verified to occur on refuge.	Conduct surveys.	No active management.
<b>Invasive and Exotic Plants</b>	No active management.	Control privet, mimosa, and kudzu.	Same as Alternative A.



<b>KEY TOPICS</b>	<b>Alternative A - Current Management (No Action Alternative)</b>	<b>Alternative B - Expand Habitat and Wildlife Management (Proposed Alternative)</b>	<b>Alternative C - Emphasize Natural and Primitive Processes</b>
<b>Goal 3:</b> Conserve, manage, and restore populations of native animal species representative of the Cahaba River basin.			
<b>T&amp;E Mussels/Snail</b>	No active management.	Work with partners to identify and provide access for reintroductions.	Same as Alternative B.
<b>T&amp;E Fish</b>	No active management.	Work with partners to identify and provide access for reintroductions.	Same as Alternative B.
<b>Neotropical migrants</b>	Survey 2010	Inventory, continue surveying, and monitor.	Same as Alternative B.
<b>Gray Bat</b>	Baseline survey 2007-2009	Inventory, continue surveying, and monitor.	Same as Alternative B.
<b>Bald eagle</b>	Does state survey over refuge?	Identify nests and protect from disturbance.	Same as Alternative B.
<b>Other Surrogate Species</b>	None identified at this time.	Inventory, continue surveying, and monitor.	Same as Alternative B.
<b>Invasive and Exotic Animals</b>	No active management.	Monitor and control, where needed, exotic wildlife.	Same as Alternative A.
<b>Visitor Services</b>			
<b>Goal 4:</b> Ensure visitors of all abilities and varied interests have opportunities to participate in and enjoy the refuge for hunting, fishing, wildlife observation, interpretation, photography, and environmental education, whereby motivating them to value, support, and contribute to the refuge and National Wildlife Refuge System, increase their understanding of the Cahaba River and upland habitats, and help them become better environmental stewards.			
<b>Hunting</b>	Generally, Cahaba River WMA regulations are followed with some exceptions such as deer bowhunting only on refuge.	Same as Alternative A.	Same as Alternative A.

<b>KEY TOPICS</b>	<b>Alternative A - Current Management (No Action Alternative)</b>	<b>Alternative B - Expand Habitat and Wildlife Management (Proposed Alternative)</b>	<b>Alternative C - Emphasize Natural and Primitive Processes</b>
<b>Fishing</b>	State regulations including night fishing; bank fishing	Same as Alternative A.	Convert River Trace Road to trail.
<b>Wildlife Observation and Photography</b>	-TBD miles of trails -2 overlooks -River Trace Road (Sarah trail inventory)	In addition to Alternative A, add benches to overlooks.	Same as Alternative A, but convert River Trace Road to trail.
<b>Environmental Education</b>	None	Work with partners to develop and present educational programs that emphasize the importance of wildlife habitat and population management.	Work with partners to develop and present educational programs that emphasize the role of natural ecological processes in shaping wildlife habitats.
<b>Interpretation</b>	-some interpretive efforts in conjunction with Cahaba Lily Day, Cahaba River Ramble, Renew Our Rivers, Cahaba River Society-led canoe trips -Piper Trail -kiosk at River Trace Rd	In addition to Alternative A: -add kiosk to trail off River Trace Rd -add interpretive signs along Piper Trail -develop herp brochure	Develop interpretive materials and messages that emphasize the role of natural and primitive processes in shaping wildlife habitats.
<b>Canoeing and kayaking</b>	Available – concrete basin	Enhance current launch site	Remove concrete basin.
<b>Bicycle riding</b>	On roads open to vehicles	Same as Alternative A	Convert River Trace Road to trail.

<b>KEY TOPICS</b>	<b>Alternative A - Current Management (No Action Alternative)</b>	<b>Alternative B - Expand Habitat and Wildlife Management (Proposed Alternative)</b>	<b>Alternative C - Emphasize Natural and Primitive Processes</b>
<b>Resource Protection</b>			
<b>Goal 5:</b> Identify, conserve, and protect natural and cultural resources through partnerships, acquisition, and land protection programs within the Cahaba River watershed.			
<b>Water quality</b>	- 4 water quality monitoring stations (heavy metals) as part of mine reclamation (2013-2015) - Contaminant Assessment Process (expected Fall 2013)	In addition to Alternative A: -participate as stakeholder on regional water quality improvement efforts within the upper Cahaba Basin; -work to improve water quality of refuge tributary streams through partnerships with adjacent land owners; and - establish cooperative programs and partnerships with the University of Alabama for lands along the western refuge boundary.	Same as Alternative B, but also ensure that mine tailings do not contaminate groundwater through removal or other means.
<b>Hydrology</b>	WRIA (Fall 2013)	No active management.	Restore natural hydrology on the refuge in areas where there is the greatest need.
<b>Land Protection</b>	Ongoing within acquisition boundary as opportunities arise.	Same as Alternative A.	Prioritize tracts within the acquisition boundary based on their potential role in creating a more connected and functional ecosystem.
<b>Cultural resources</b>	No known cultural resources; no comprehensive assessment has been conducted.	Complete a comprehensive historical and archaeological resource survey on current refuge lands and any additional lands acquired	Same as Alternative A.

<b>KEY TOPICS</b>	<b>Alternative A - Current Management (No Action Alternative)</b>	<b>Alternative B - Expand Habitat and Wildlife Management (Proposed Alternative)</b>	<b>Alternative C - Emphasize Natural and Primitive Processes</b>
<b>Refuge Administration</b>			
<b>Goal 6:</b> Provide sufficient refuge infrastructure and staff to implement a comprehensive refuge management program in order to protect and manage the natural and cultural resources of the refuge.			
<b>Staffing</b>	<ul style="list-style-type: none"> <li>-refuge manager stationed in Anniston, AL</li> <li>-assistant manager (unfilled)</li> </ul>	<ul style="list-style-type: none"> <li>- Refuge Manager</li> <li>- assistant refuge manager (unfilled)</li> <li>- biologist</li> <li>- equipment operator</li> <li>- park ranger</li> <li>- forester</li> <li>- law enforcement officer</li> <li>- biological technician</li> </ul>	<ul style="list-style-type: none"> <li>- Refuge Manager</li> <li>- assistant refuge manager (unfilled)</li> <li>- biologist</li> <li>- law enforcement officer</li> </ul>
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>-TBD miles gravel roads</li> <li>-2 wooden bridges</li> <li>-gates</li> <li>-culverts</li> <li>-benches</li> <li>-2 overlook decks</li> <li>-2 unpaved parking areas</li> </ul>	<p>In addition to Alternative A:</p> <ul style="list-style-type: none"> <li>-improve River Trace Road (e.g. low water crossings, culverts, improved road surface, etc.) and protect from erosion (undercutting by river).</li> <li>-improve Belcher Road through regular maintenance</li> </ul>	<p>Convert River Trace Road to trail. Evaluate which road-side ditches and culverts need to be altered to restore former hydrology and reduce sedimentation.</p>
<b>Facilities</b>	None	<ul style="list-style-type: none"> <li>-office/VCS (West Blocton)</li> <li>-pole shed</li> <li>-maintenance shop</li> </ul>	Same as Alternative A.

<b>KEY TOPICS</b>	<b>Alternative A - Current Management (No Action Alternative)</b>	<b>Alternative B - Expand Habitat and Wildlife Management (Proposed Alternative)</b>	<b>Alternative C - Emphasize Natural and Primitive Processes</b>
<b>Refuge Administration</b>			
<b>Goal 7.</b> Continue to nurture, enhance and expand refuge relationships with current and potential partners to expand the refuge's capacity to protect and monitor biological resources, implement habitat improvement projects, enhance interaction and education of refuge visitors and encourage cooperative programs with academic institutions and nongovernmental organizations			
<b>Partnerships</b>	-NGO booths at various events	In addition to Alternative A, develop MOUs with partners (prescribed fire, biological surveys & monitoring, EE)	In addition to Alternative A, develop MOUs with partners to assist with the conversion of loblolly stands to longleaf pine.
<b>Volunteers</b>	-Pick up trash along refuge roads and County Road 24 -Maintain trails	In addition to Alternative A, train volunteers to conduct interpretive programs (emphasizing the need for wildlife and habitat and wildlife management); develop projects (interpretive signs, invasive species control, biological monitoring, etc.)	In addition to Alternative A, train volunteers to conduct interpretive programs that emphasize the role of natural and primitive processes in shaping wildlife habitat.

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## ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

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

The following two alternatives were discussed, but not further developed. The management emphasis for these two alternatives was derived from the special designations, Cahaba River Critical Habitat and Significant Landscape for Longleaf Pine Conservation and Management (CCP Chapter II: Refuge Overview).

- **Cahaba River focus** – under this alternative, the focus of management efforts would have been to improve water quality of the Cahaba River, with the aim of improving conditions for several federally listed aquatic species. This alternative was discarded because of the realization that management actions on the refuge would do little to improve the water quality of the river. Land use practices upstream of the refuge are the primary causes of declines in water quality.
- **Longleaf pine focus** – under this alternative, management emphasis would have been on terrestrial habitats and wildlife species. Longleaf pine restoration would have been enhanced. This alternative was abandoned because it was too specific on directing management only towards pine-dominated habitats, at the possible expense of other habitats.

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## *IV. Environmental Consequences*

### **OVERVIEW**

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

### **EFFECTS COMMON TO ALL ALTERNATIVES**

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

#### *ENVIRONMENTAL JUSTICE*

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

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

#### *CLIMATE CHANGE*

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

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

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

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

#### *OTHER MANAGEMENT*

All management activities that could affect the refuge’s natural resources, including subsurface mineral reservations; utility lines and easements; soils, water and air; and historical and archaeological resources, would be managed to comply with all laws and regulations. In particular, any existing and future oil and gas exploration, extraction, and transport operations on the refuge would be managed identically under each of the alternatives. Thus, the impacts would be the same.

#### *LAND ACQUISITION*

Funding for land acquisition from willing sellers within the approved acquisition boundary of Cahaba River NWR would come primarily from the Land and Water Conservation Fund or donations from conservation and private organizations. Conservation easements and leases can be used to obtain the minimum interests necessary to satisfy refuge objectives, if the refuge staff can adequately manage uses of the areas for the benefit of wildlife. The Service can negotiate management agreements with local, state, and federal agencies, and accept conservation easements. Some tracts within the refuge acquisition boundary may be owned by other public or private conservation organizations. The Service would work with interested organizations to identify additional areas needing protection and provide technical assistance if needed. The acquisition of private lands is entirely contingent on the landowners and their willingness to participate.

#### *CULTURAL RESOURCES*

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

Service acquisition of land with known or potential archaeological or historical sites provides two major types of protection for these resources: protection from damage by federal activity and protection from vandalism or theft. The National Historic Preservation Act requires that any actions by a federal agency which may affect archaeological or historical resources be reviewed by the State Historic Preservation Office, and that the identified effects must be avoided or mitigated. The Service’s policy is to preserve these cultural, historic, and archaeological resources in the public trust, and avoid any adverse effects wherever possible.



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

#### *REFUGE REVENUE-SHARING*

Annual refuge revenue-sharing payments to Bibb County would continue at similar rates under each alternative. If lands are acquired and added to the refuge, the payments would increase accordingly.

#### *OTHER EFFECTS*

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

### **SUMMARY OF EFFECTS BY ALTERNATIVE**

The following section describes the environmental consequences of adopting each refuge management alternative. Table 25 at the end of this section summarizes and addresses the likely outcomes for the specific issues, and is organized by broad issue categories.

#### *PHYSICAL RESOURCES*

This section discusses the possible impacts, under each alternative, on climate change, hydrology, geology, topography, soils, air quality, water quality, and noise.

#### **Impacts on Climate Change**

Climate change, as a result of land use practices and the release of greenhouse gases, has been identified by the Service as a serious issue, as further detailed in Chapter II of the Draft CCP. Overall, impacts to climate change are expected to be minimal, but likely beneficial because lands that are managed in a manner that mimics a more natural state generally are not significant sources of greenhouse gases.

#### *Beneficial*

Under each of the alternatives the refuge is expected to have positive, albeit small, net effects with respect to greenhouse gas emissions and associated climate change.

The refuge would continue to acquire and protect lands, thereby increasing the acreage of land covered with natural vegetative communities. Plants absorb CO<sub>2</sub> and as a result, vegetated areas can act as an important carbon sink (Heath and Smith 2004). This “carbon sequestration” is essentially the process by which plants take up carbon dioxide through photosynthesis, after which it is stored in plant biomass (wood) and in the soil. Generally, succession to forest stores the most carbon, and the rate of sequestration declines as trees mature (Heath and Smith 2004). Alternatives A and B would probably retain the largest extent of intact forests, and would have the highest level of carbon sequestration.

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### *Adverse*

Under each alternative, the refuge would continue to use equipment, machinery, and vehicles in support of maintenance operations and general habitat and wildlife management activities. These would include pick-up trucks, 4-wheel all-terrain vehicles, weed eaters, lawn mowers, etc., that use gasoline, as well as diesel-powered dozers, backhoes, and tractors. In compliance with Section 141 of the 2007 Energy Independence and Security Act [which requires federal agencies to acquire low greenhouse gas (GHG) emitting vehicles], the refuge would continue to replace older vehicles with hybrid or other low emission models, where feasible. Additionally, the refuge would continue to implement the Service's 2008 Fleet Action Plan (USFWS Five-Year Fleet Plan Service Transportation Review Board Charter), with concomitant benefits to air quality. In summary, emissions associated with the sources discussed above are expected to have minimal impacts on air quality.

Refuge visitation is likely to rise, regardless of alternative, with an associated increase in the number of vehicles on the refuge. The number of vehicles on the refuge at any given time is not expected to be sufficiently large to create a significant contribution of greenhouse gas emissions.

As described in Chapter IV of the Draft CCP, prescribed burning would continue to be a valuable habitat management tool, under all alternatives. The primary gases released during prescribed fire include CO<sub>2</sub>, a major greenhouse gas. However, the amount of CO<sub>2</sub> released during these events is not expected to constitute a significant amount. In addition, increased vegetative growth following each prescribed burn would likely absorb a similar amount of CO<sub>2</sub> released. Furthermore, prescribed fires help prevent wildfires, which can release large amounts of greenhouse gas from the combustion of entire forests (Wiedenmyer and Hurteau 2010). Under Alternative C, pine-dominated forests would not be actively managed, possibly resulting in die-offs due to disease, insects, or wildfires. Hence, there would be an increased chance of those areas becoming sources of carbon to the atmosphere.

### **Impacts on Hydrology**

With the exception of historical mining areas and some roads, the hydrology on most of the refuge remains intact. This section evaluates the effects on hydrology as a result of potential management actions under each of the alternatives.

### *Beneficial*

Under all alternatives, the addition of lands inside the acquisition boundary would help protect those areas from potential future hydrological impacts resulting from ditching, road-building, and other alterations.

Under Alternatives A and B, there would be no benefits to hydrology. For Alternative C, some site-specific hydrological restoration associated with roads would occur, benefitting the hydrology in localized areas.

### *Adverse*

Adverse impacts to hydrology are not anticipated under any of the action alternatives.

### **Impacts on Geology and Topography**

The geology of the refuge is not expected to be negatively affected by any activities, under any alternative. Each of the alternatives proposes the protection of additional lands within the acquisition boundary, which would preclude those areas from any future mining operations or other activities that can affect the local geology and topography.

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## Impacts on Soils

Generally, soils on the refuge are in good condition, with little contamination and able to support the diversity of habitats that would meet our biological management goals. Under each alternative, management would serve to minimize human disturbance to soils, by prohibiting off-road vehicle use by the public, for instance.

### *Beneficial*

Under each alternative, the refuge would continue to use best management practices in all activities that might affect refuge soils to ensure that soil productivity is maintained and erosion minimized. Land protection efforts would continue to pursue acquisition of forested areas from willing sellers. This would greatly benefit soils, as acquired lands would no longer be subjected to road construction, ditching, heavy machinery, clear-cut logging, and other practices that can damage soils and cause erosion.

### *Adverse*

Within each of the alternatives, maintenance of roads and trails would continue, causing some soil disturbance. The exact number and length of roads and trails are unknown at this time because most of this work would be performed on lands that have yet to be acquired. These construction and maintenance activities would require placement of fill-dirt to be deposited on existing soils and other actions that would disturb soils. Although some soils would be altered, the affected areas would represent a relatively small proportion of all refuge soils, and would constitute a minimal impact.

Under each alternative, the refuge would continue to use Service-approved chemicals to control invasive plants. These actions require internal approval, through a Pesticide Use Proposal, for all uses of chemicals on the refuge. The refuge manager, regional pest management coordinator, and national pest management coordinator have the authority to approve chemicals and their application procedures.

Public use is likely to cause some soil disturbance. Most of the visiting public utilizes existing roads and trails, with no impacts to soils from trampling. Hunters are permitted to access vegetated areas, with the potential for some trampling of vegetation. However, the intensity and duration of any off-trail activities associated with hunting are expected to be low, and soil disturbance is likely to be almost non-existent.

Under Alternatives A and C, no additional soil impacts would be anticipated, as no new facilities are proposed under these options. However, for Alternative B, if any facilities are built, there would be minimal impacts to soils resulting from use of heavy machinery, covering by impervious surfaces, etc. These impacts would be localized (footprint of buildings and associated parking lots) and relatively small, compared to the overall area of the refuge.

## Impacts on Air Quality

Chapter II of the Draft CCP "Refuge Overview," discusses the status of air quality in the landscape around the refuge. This chapter evaluates the effects of the seven primary air pollutants as defined by the Clean Air Act (CAA) of 1970 (as amended in 1990 and 1997).

For the purposes of this Draft CCP/EA, the relative amounts of potential air pollutants that would be emitted under each alternative were not estimated. However, the Service believes that the impacts of refuge management on air quality would not vary significantly under any of the alternatives. Hence, the discussion of beneficial and adverse effects on air quality has been combined in this section. The Service predicts that refuge land management, regardless of the alternative, would have a net

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positive effect on air quality. Maintaining vegetative cover, improving energy efficiencies, and limiting public uses to those that are appropriate, compatible, and wildlife-oriented would collectively help reduce any air quality impacts.

The potential beneficial effects of the management evaluated include the potential of continuing and expanding our energy efficiency practices to reduce the refuge contribution to emissions.

The potential adverse effects of the management alternatives we evaluated include emissions from vehicles or equipment and particulates from prescribed fires as a management tool.

### *Beneficial*

Maintaining natural vegetation on the refuge would continue to provide benefits to air quality with respect to the six air pollutants for which 1990 National Ambient Air Quality Standards (40 CFR part 50) have been established by the EPA. Trees have been shown to reduce the concentration of ozone (O<sub>3</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), and particulate matter (PM) less than 10 and 2.5 microns in diameter (PM<sub>10</sub> and PM<sub>2.5</sub>), primarily through direct uptake and adhesion to stems and leaves (Escobedo et al. 2007).

### *Adverse*

Under each alternative, the refuge would continue to use equipment, machinery, and vehicles in support of maintenance operations and general habitat and wildlife management activities. Vehicles and motorized equipment release several air pollutants. However, the frequency and intensity of use of refuge vehicles and machinery are relatively low, and the contribution of the refuge to air pollution is expected to be negligible.

Refuge visitation is likely to rise, regardless of alternative, with an associated increase in the number of vehicles on the refuge. The number of vehicles on the refuge at any given time is not expected to be sufficiently large to create a significant impact to air quality.

As described in Chapter II, prescribed burning would continue to be a valuable habitat management tool, under all alternatives. The primary gases released during prescribed fire include CO<sub>2</sub>, CO, and water vapor, with other gases present in trace amounts (Environmental Protection Agency 40 CFR Part 5). With fire, the pollutant of primary concern is particulate matter. Particulates can reduce visibility or cause negative effects on the health of people with respiratory illnesses. Appropriate smoke management can minimize or nearly eliminate both of those negative effects. The consideration of the wind speed, direction, and mixing heights is all-important in managing smoke. In planning prescribed burns, the refuge would consider all those factors, and other environmental and geographical factors, as detailed in the refuge Habitat Management Plan (USFWS 2007). Based on the refuge's experience, prescribed burning is not expected to produce major, long-term negative impacts with regards to air quality.

### Impacts on Water Quality

Water quality on the refuge is largely influenced by land-use practices upstream of the refuge. Generally, areas that are covered in natural vegetative communities tend to have a positive effect on the water quality downstream, because soils and plant roots take up some types of water pollution and help minimize erosion and subsequent sedimentation.

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### *Beneficial*

Various land use practices (development, agriculture, commercial forestry) can increase the risk of stormwater run-off and pollution (Zedler 2003). Under each alternative, impacts to water quality as a result of stormwater run-off are expected to be less on current (and potential future) lands managed by the refuge. Thus, conservation lands are expected to improve water quality.

Under Alternative A, benefits to water quality would be as described above. For Alternatives B and C, there could be some minimal improvements to water quality resulting from cooperative and partnership efforts within the basin and at a local level (e.g., best management efforts focused at refuge tributaries). Furthermore, for Alternative C, additional benefits would be achieved by ensuring that leaching at mine tailing sites is minimized, further protecting groundwater from contamination.

### *Adverse*

Some adverse direct and indirect impacts to water quality as a result of future refuge management and public use activities are anticipated and include:

- vegetation trampling;
- maintenance projects, roads and culverts; and
- use of herbicides.

Under each alternative, refuge visitation is expected to increase. However, vegetation trampling and associated soil erosion and possible impacts to water quality are expected to be minimal. Most of the public would be restricted to designated roads and trails. Activities (such as hunting) that allow the public to access vegetated areas are not expected to cause any significant vegetation or soil disturbance, because they are spread out over a relatively large area and confined to a short time frame.

Road and trail maintenance projects, including the replacement of culverts, are expected to occur to some degree under each alternative. Some soils would enter the water, and these are expected to increase turbidity. Consequences to water quality are expected to be short-lived and localized.

The use of herbicides on the refuge would continue, regardless of alternative. The risk that herbicides used on the refuge reach open water is small. For details of the chemicals used, see the "Soils" section above. Through the proper use of approved herbicides, following Best Management Practices, protocols outlined in pesticide use plans, and other Service guidelines, impacts to water quality on the refuge are expected to be minimal.

Under Alternative A and B, there could be continued groundwater contamination resulting from mine site leaching.

## **Impacts on Noise**

### *Beneficial*

Under all alternatives, benefits to the soundscape would result from protecting land from development and other land uses that contribute noise.

### *Adverse*

Noise impacts are expected to be similar under each alternative. Sources of noise would include traffic, mechanized equipment (mowing, brush-hogging, etc.), firearms, and road maintenance projects. Noise from traffic would be minimal on refuge roads due to low speeds and limited use. During the hunting season, there would be noise from firearms, but only during daylight hours and very infrequently. Road maintenance and equipment-related noise would be of short duration. In

general, noise generated by any of these sources could potentially have discernible, but temporary effects on nearby wildlife and people.

**Biological Resources**

**Impacts on Habitat Types**

The management activities proposed in the alternatives that would affect habitats on the refuge include prescribed fires, treating invasive or unwanted vegetation with herbicides, constructing new trails, constructing new public use facilities, and changing opportunities for public use. In this section, direct impacts on habitats under the three management alternatives are discussed. Table 24 shows the approximate acreages of refuge habitats under each of the alternatives after 15 years. Potential indirect consequences to wildlife resulting from changes in habitat are addressed under the wildlife impact sections.

**Table 24. Approximate acreages of refuge habitats under Alternatives A, B, and C**

Habitat Type	Acreage		
	Alternative A	Alternative B	Alternative C*
Interior longleaf pine woodland	1,232	1,232	Less than 1,232
Loblolly pine plantation	1,086	0	Less than 1,086
Longleaf pine plantation	215	1,301	Less than 215
Hardwood-dominated forests	999	999	More than 999
Open water (Riverine)	72	72	72
Cahaba lily and water willow shoals	41	41	Less than 41
Canebrake	21	21	21
Cahaba riverwash herbaceous vegetation	7	7	7
<b>Total</b>	<b>3,673</b>	<b>3,673</b>	<b>3,673</b>

**Geographical Information System (GIS) Database**

Regardless of alternative, we would continue to maintain, and expand when feasible, a comprehensive GIS-based database for the refuge and the surrounding landscape to map and analyze habitat types and conditions, rare species populations, other ecological features, land use issues, and other relevant information for long-term planning and monitoring of resources. The use of a GIS-based system allows the refuge to track the effects of its management on a variety of habitats.

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### ***Invasive Plant Control***

Under each alternative, the refuge would continue to control or eradicate invasive plants, including Chinese privet and honeysuckle. Left unchecked, these species can alter the structure and function of native vegetative communities on the refuge, with negative consequences to wildlife, refuge operations, and visitors. Control methods include mechanical and chemical treatments.

Removing plants manually would cause some minor soil disturbance of short duration. Service-approved herbicides would be used to control invasive plants when deemed necessary. Broad-spectrum herbicides, such as glyphosate, when applied by boom applicator, also kill non-target species of plants. Typically, selective application would be used, unless the site covered was too large, requiring a method more effective for treating a broader area. The Service believes the reduction of competitive invasive or nuisance species outweighs the loss of some beneficial vegetation.

### ***Administering the Refuge***

Under each alternative, we plan some administrative activities, such as improving roads. Most of the impacts on natural habitats resulting from those actions would be minor, temporary, and confined to sites that have already been altered in the past for those uses.

### ***Offering Public Use***

The present level of public use on refuge lands consists of hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. These priority public uses would continue to have minimal negative direct or indirect impacts to habitats, as visitors generally are confined to designated roads, trails, or specially provided access points and overlooks. In addition, ATVs, off-road vehicle travel, permanent stands and blinds, camping and fires would remain prohibited. There would be some trampling of vegetation by hunters, but we expect these impacts to be minimal as their numbers and hunting are regulated. Furthermore, hunting would occur during the non-growing season. In addition, foot traffic would affect mostly forbs and grasses, many of which are seasonal. Under this alternative, public visitation and use would increase on its own as the public becomes more familiar with and aware of the opportunities provided by the refuge.

## **Impacts Resulting from Habitat Management**

### **Open Water (Riverine) Habitat**

There would not be any management of open water habitat under any of the alternatives.

### **Cahaba Lily and Water Willow Shoals**

#### ***Beneficial***

Alternative A is not expected to have any positive effects on this habitat. For Alternative B and C, outreach and education efforts aimed at reducing boat/foot traffic to these shoals could have some positive effects by reducing damage to this fragile habitat.

#### ***Adverse***

Under Alternatives A and C, damage from boats/trampling could increase, as more people use the river, and the acreage of this resource could decline. No additional adverse impacts are anticipated under Alternative B.

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## **Beaver Pond**

### *Beneficial*

No benefits to this resource are expected under Alternatives A and B. Under Alternative C, the area's natural hydrology could be restored.

### *Adverse*

No negative impacts are expected under any of the alternatives.

## **Pine-dominated Habitats**

Pine-dominated habitats on the refuge consist of interior longleaf pine woodland, loblolly pine plantation, and longleaf pine plantation.

### *Beneficial*

Under Alternative A, commercial thinning would reduce overstocking in loblolly plantations, while periodic prescribed fire would help maintain more open conditions in longleaf pine woodland and longleaf pine plantations. These benefits would also be realized under Alternative B. However, this alternative would restore longleaf pine stands and reestablish a recurring fire regime, resulting in a more open forest structure with a more diverse understory and groundcover. Additionally, all loblolly pine plantation stands would be converted to longleaf pine under Alternative B. There would be minimal benefits to these habitats under Alternative C.

### *Adverse*

Under Alternative C, pine-dominated habitats would not be subject to thinning or prescribed fire. Loblolly pine stands would not be converted to the more biodiverse system supported by longleaf pine. Management efforts would consist primarily of building and maintaining firebreaks, with the aim of minimizing wildfire damage to adjacent lands. Pine-dominated forest would likely become more susceptible to disease, insect outbreaks, and catastrophic wildfire. Hardwoods would encroach and eventually some of these habitats could become hardwood forests. Hence, it is expected that the acreage of pine-dominated habitat would be substantially reduced.

## **Hardwood-dominated Habitats**

Hardwood-dominated forests include the following: oak, hickory, and iris forest; beech, oak, laurel, and azalea forest; oak, holly, and sparkleberry forest; oak, beech, and sedge forest; and tuliptree and sensitive fern forest.

### *Beneficial*

Under Alternatives A and C, there would be no benefits to these habitats. Under Alternative B, these habitats would be mapped.

### *Adverse*

Under Alternative C, hardwoods would increase in acreage at the expense of longleaf pine forest.

## **Canebrake**

### *Beneficial*

Under Alternatives A and C, no benefits are expected. Under Alternative B, this habitat type would be mapped.



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*Adverse*

No adverse impacts are anticipated under any of the alternatives.

**Cahaba Riverwash Herbaceous Vegetation**

*Beneficial*

Under Alternatives A and C, no benefits are expected. Under Alternative C, this habitat type would be mapped.

*Adverse*

No adverse impacts anticipated under any of the alternatives.

**Imperiled Plants and Rare Habitats**

*Beneficial*

Under Alternatives A and C, there would be no benefits to Georgia aster, Georgia rockcress, or glades. Under Alternative B, additional surveys could help identify these imperiled plants and/or habitats, resulting in greater protection.

*Adverse*

Under Alternatives A and C, new information about these imperiled plants and rare habitats would not be collected, resulting in less protection. Negative effects on these resources are not expected for Alternative B.

**Fish and Wildlife**

The populations of fish and wildlife on the refuge are affected by habitat management, the regulation of public use and access, and other programs that are part of operating a refuge. The focus of these programs would vary under each alternative, resulting in different consequences to fish and wildlife.

*Beneficial*

***Managing Habitat***

Habitat management techniques, such as prescribed burning and controlling invasive species would be carried out to improve habitat conditions for a variety of wildlife species.

***Managing Invasive Plants***

Under each alternative, the refuge would continue to control or eradicate invasive plants, such as Chinese privet and honeysuckle. Minimizing the presence of invasive plants on the refuge would provide improved foraging and breeding opportunities, suitable cover, and other benefits to native wildlife species.

*Adverse*

***Managing Habitat***

Habitat management activities that are aimed at setting back succession, such as prescribed burning, would injure or kill some small- to medium-sized animals that are unable to find refuge or otherwise flee. However, we believe the risk to be low or the impact to be slight at the population level, and always of short duration. Prescribed burning would be scheduled outside the breeding season or in units where few birds are nesting. It is possible that some nests could be destroyed, but many of the affected birds would likely re-nest in other suitable habitat. Prescribed burning generates fast-

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moving, surface fires which rarely burn down to the soil, and many small mammals could find shelter in the unburned duff. There could presumably be occasional reptile and amphibian mortality.

The temporary loss of cover, lasting several days to weeks, resulting from prescribed fires, could make some species (especially small mammals and herps) more vulnerable to predation. Displaced small mammals would move from treated areas into adjacent habitat, resulting in increased competition with established populations.

### ***Managing Invasive Plants***

Impacts from the use of herbicides could be expected as a result of efforts to control or eradicate invasive plants. As discussed in the soil and water quality sections, the types of chemicals used on the refuge are expected to have a minimal effect on fish and wildlife species. Accessing areas for spraying could cause some disturbance, with nesting birds being most vulnerable. When nests are approached too closely, adult birds may flush, exposing the eggs to weather conditions or predators. Overall, we expect invasive species management techniques to have a minimal impact to wildlife, which would be outweighed by the positive effects resulting from the restoration of native habitats.

### ***Administering the Refuge***

We plan some administrative activities under each alternative, such as improving roads. These activities could cause some disturbance to wildlife. However, refuge staff would ensure that the impacts would be kept to a minimum by scheduling, whenever possible, projects outside of the bird nesting season. Therefore, most of the impacts from these actions would be minor and temporary.

### ***Offering Public Use***

Since refuge lands are held in the public trust by the Service, access is generally allowed for compatible, priority wildlife-dependent public uses. Uses are limited when federal trust resources will be impacted; the activity will detract from achieving refuge purposes or the Refuge System mission, or when administrative resources are not available to ensure a safe, quality experience. Under each alternative, we would allow the six priority public uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. In addition, several other public uses that facilitate the priority public uses would continue in some capacity, such as canoeing/kayaking, biking, etc.

An important component of refuge management includes maintaining a careful balance between wildlife conservation and public use, and a 1987 study of refuges in the northeast found that 16 National Wildlife Refuges reported various impacts to wildlife resulting from public use and identified various mitigation measures to minimize these effects (USFWS 1987). For a more recent source of information on the subject, refer to: "A Human-Dimensions Review of Human-Wildlife Disturbance: A Literature Review of Impacts, Frameworks, and Management Solutions" (Cline et al. 2007).

The primary impacts to fish and wildlife populations would be those associated with disturbance and the taking of fish and wildlife. An overview of the impacts of these uses on wildlife is provided below. For more specific information on the potential effects of these uses, especially in relation to Alternative B, refer to the compatibility determinations detailed in Appendix F.

We would expect short-term and long-term adverse impacts to wildlife populations resulting from use of trails, refuge roads, and hunting. Predicting the effects of disturbance is not a straight forward matter, as the resultant behavior of wildlife varies according to a combination of factors. Disturbances will vary by wildlife species involved and the type, level, frequency, duration, and the time of year activities occur. Even when people stay on trails, they will have some effect on the behavior of many wildlife species. Furthermore, adverse effects to wildlife have been shown to be directly proportional to increases in the number of users (Beale and Monaghan 2004). According to the study, groups of visitors using trails were more likely to cause behavioral changes in the animals studied when

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compared to individual visitors. Similarly, use of refuge roads will have some disturbance effects on wildlife (mostly birds) found in adjacent areas.

Some of the effects of disturbance on wildlife that have been documented include: shifts in habitat use, abandonment of habitat, increased energy demands, lowered survival, and reduced nesting success (Schulz and Stock 1993, Knight and Cole 1995 in Knight and Gutzwiller 1995).

Hunters can access areas off trails, causing some disturbance to birds and other wildlife. However, it is expected that at any one time, there is a relatively low density of hunters per acre. Therefore, these effects are expected to be of low intensity and short duration and during non-breeding seasons so they will have minor consequences.

With respect to hunting, both direct benefits and adverse impacts to refuge habitats can be expected. Deer hunting benefits a variety of vegetative communities by keeping deer populations within the carrying capacity of the habitat, thus reducing excessive damage to vegetation caused by over-browsing and maintaining understory habitat for other species (Rawinsky 2008). Conversely, some direct adverse impacts on vegetation may occur as a result of hunting activities. However, those impacts should be minimal, because the refuge prohibits the use of ATVs, off-road vehicle travel, permanent stands and blinds, camping, and fires, which are most likely to damage vegetation. Hunter trampling of vegetation is likely to be further minimized as a result of the high acreage to hunter ratio, limited number of hunt days, and time of year (dormant season).

The refuge provides some access to the Cahaba River for anglers. The fishing public could cause some disturbance to foraging bald eagles and osprey, wading birds, and other birds using the open water areas. However, these events are expected to have a minimal impact as areas accessible to the public are relatively small in comparison to the habitats used by these species. The Service does not have jurisdiction over the Cahaba River, and can therefore not regulate fishing from boats. Regardless, game fish populations in the river are believed to be at healthy levels that are able to support the anticipated fishing intensity. There could be some indirect impacts to non-target wildlife (particularly birds) as a result of entanglement in fishing gear. However, educating the public about the proper disposal of used fishing line should keep these effects to a minimum.

## **Birds**

The focus of the impact discussions is on neotropical migratory birds and bald eagles.

### *Beneficial*

Under Alternatives A and B, neotropical migratory birds that utilize pine-dominated habitats are expected to benefit from more open stand conditions. No benefits to this group of birds are expected for Alternative C.

### *Adverse*

Under Alternative C, continued declining condition or acreage of pine-dominated stands due to hardwood encroachment, disease or insect damage, and catastrophic wildfire would negatively affect land birds that utilize these habitats.

## **Mammals**

Mammals on the refuge consist largely of relatively common species found across the southeast. Most of these species are able to utilize a variety of terrestrial woodland habitats, and their populations on the refuge would not be expected to change under each alternative.

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## **Reptiles and Amphibians**

### *Beneficial*

There are expected to be some benefits to reptiles and amphibians that utilize pine-dominated habitats as these stands improve, as under Alternatives A and B. No benefits are expected under Alternative C.

### *Adverse*

No adverse effects to these taxa are expected under Alternatives A and B. However, under Alternative C, a decline in condition or acreage of pine-dominated stands would likely have negative consequences for reptiles and amphibians utilizing those areas.

## **Aquatic Species**

### *Beneficial*

Under Alternative A, no additional benefits to aquatic species are expected. For Alternatives B and C, partnerships within the basin and at the local level may improve water quality, benefitting aquatic species.

### *Adverse:*

Continued water quality declines are likely to negatively affect aquatic species under Alternative A. No additional adverse effects on this resource are expected under Alternatives B and C.

## **Threatened and Endangered Species**

### *Beneficial*

No benefits are expected for Alternative A. Federally listed fish and mussels would likely benefit under Alternatives B and C, as a result of water quality improvements and reintroduction efforts. No additional benefits to gray bats expected under any alternative.

### *Adverse*

Some minimal negative effects expected under Alternative A, as water quality deteriorates and no dedicated efforts to reintroduce listed species in refuge waters are undertaken. No adverse effects are expected as a result of Alternatives B and C. Adverse impacts to gray bats not expected under any alternative.

## **Refuge Archaeological and Historical Resources**

There are no known cultural resources on the refuge.

## **Socioeconomic Environment**

### *Beneficial*

Under each alternative, the refuge would provide socioeconomic benefits by providing recreational opportunities and through the contribution of money to local economies through the purchasing of goods and services within the local community for refuge operations and spending in the local area by refuge visitors. In addition, as required by the Refuge Revenue Sharing Act (16 U.S.C. 715s, as amended) the refuge would continue to offset the tax losses by making an annual payment in lieu of taxes to the local townships.

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Currently, more than 30,000 visitors annually come to the refuge. Over the 15-year plan, this could increase to approximately 60,000. They would continue to contribute to the local economy through consumption of goods and services, equipment rentals, and other expenditures associated with recreational opportunities made available on the refuge. A detailed analysis and discussion of how money associated with national wildlife refuges makes its way through local economies can be found in, "Banking on Nature 2013: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation" (Carver and Caudill 2013). They estimated that 46.5 million people visited refuges in 2011 and their spending generated \$2.4 billion of sales in regional economies.

Additionally, under Alternatives B and C, eight full-time staff would increase the contribution to the local economy. Recurring salary would approximate \$812,497 annually. Furthermore, there could be some additional economic benefits under Alternative B resulting from building or leasing a refuge office, pole shed, and maintenance shop.

#### *Adverse*

No adverse socioeconomic impacts are expected under any of the alternatives.

### **Impacts on Land Use Common to All Alternatives**

Under each alternative, the refuge would continue to acquire lands from willing sellers. Most of the lands potentially available in the current acquisition boundary are commercial forests or farmlands. Hence, land use would change at the local scale. However, this impact is expected to be minimal, as it would only affect a relatively small fraction of the total land use within Bibb County. Regionally, approximately 70 percent of the land is forested. Even if all the lands in the current acquisition boundary were acquired and taken out of silvicultural or agricultural production through conversion to more natural habitats, it would account for less than one percent of the total land surface in commercial forestry or agriculture, an insignificant change.

### **Refuge Administration**

#### **Staffing**

Under Alternative A, the current work force of one (off-site) full-time equivalent (FTEs) would be maintained. Refuge base salaries (including benefits and associated management capability costs) would total approximately \$164,117 annually. Alternatives B and C would add eight FTEs, and the cost would be about \$ 812,497 annually. See Chapter IV of the Draft CCP for a detailed breakout of staffing.

#### **Infrastructure Maintenance**

Maintenance operations would remain largely the same under alternative. However, under Alternative C, River Trace Road would be shortened, with part of the road converted to a trail.

#### **Impacts to Visitor Services**

The following section discusses impacts to the six priority public uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation), as well as other facilitative recreational opportunities.

#### **Hunting and Fishing**

Under all alternatives, deer and small game hunting opportunities would be provided, as outlined in Chapter III. For anglers, opportunities would continue, with possibly a minimal reduction in river access under Alternative C, with closure of part of River Trace Road to vehicular traffic.

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### **Wildlife Observation and Wildlife Photography**

For all alternatives, adequate opportunities for wildlife observation (overlooks, trails) would continue to be provided. Under Alternative B, there may be some added benefit by benches being provided at the overlooks.

### **Environmental Education and Interpretation**

Compared to Alternative A, opportunities for environmental education and interpretation are expected to increase under Alternatives B and C. A growing percentage of the local and regional community would continue to become aware of the refuge through its programs.

### **Other Activities**

Under Alternative B, canoeing and kayaking could benefit from an enhanced boat launch site. However, these activities may be slightly diminished under Alternative C, with removal of the concrete basin and shortening of River Trace Road, thereby reducing river access to some degree.

**Table 25. Summary of environmental effects by alternative, Cahaba River NWR**

Issues	Alternative A (Current Management – No Action Alternative)	Alternative B (Proposed Alternative)	Alternative C
<b>PHYSICAL RESOURCES</b>			
<b>Climate Change</b>	<p><i>Beneficial</i> – current and possible future additional forested lands would help with carbon sequestration.</p> <p><i>Adverse</i> – operational and recreational motor vehicle use on refuge would contribute an insignificant amount of carbon to atmosphere.</p>	Same as Alternative A	Same as Alternative A
<b>Hydrology</b>	<p><i>Beneficial</i> – none</p> <p><i>Adverse</i> – none</p>	Same as Alternative A.	<p><i>Beneficial</i> – some hydrological restoration of roads possible.</p> <p><i>Adverse</i> - none</p>
<b>Geology and Topography</b>	Refuge operations would not affect these resources.	Refuge operations would not affect these resources.	Refuge operations would not affect these resources.
<b>Soils</b>	<p><i>Beneficial</i> – soil protected from off-road vehicles and other damage.</p> <p><i>Adverse</i> – some limited soil disturbance from operational and recreational activities.</p>	Same as Alternative A.	Same as Alternative A.

Issues	Alternative A (Current Management – No Action Alternative)	Alternative B (Proposed Alternative)	Alternative C
<b>Air Quality</b>	<p><i>Beneficial</i> – vegetated areas would continue to filter air.</p> <p><i>Adverse</i> – some limited air pollution from operational (e.g., prescribed fire, motor vehicle use) and recreational use (e.g., motor vehicle use).</p>	Same as Alternative A.	Same as Alternative A.
<b>Water Quality</b>	<p><i>Beneficial</i> – vegetated areas would continue to filter water.</p> <p><i>Adverse</i> – minimal sedimentation resulting from operational and recreational uses.</p>	<p><i>Beneficial</i> – in addition to Alternative A, some improvements in water quality expected as a result of basin-wide partnerships.</p> <p><i>Adverse</i> – same as Alternative A.</p>	<p><i>Beneficial</i> – in addition to Alternative B, groundwater further protected from mine tailings leachate.</p> <p><i>Adverse</i> – same as Alternative A.</p>
<b>Noise</b>	<p><i>Beneficial</i> – vegetated areas would attenuate noise.</p> <p><i>Adverse</i> – minimal sources of noise from operational and recreational activities.</p>	Same as Alternative A.	Same as Alternative A.
<b>BIOLOGICAL RESOURCES</b>			
<i>Habitat</i>			
<b>Open Water (Riverine)</b>	No management of this resource.	No management of this resource.	No management of this resource.



Issues	Alternative A (Current Management – No Action Alternative)	Alternative B (Proposed Alternative)	Alternative C
<b>Cahaba Lily and Water Willow Shoals</b>	<i>Beneficial</i> – none  <i>Adverse</i> – boat damage and trampling would continue or increase.	<i>Beneficial</i> – public education would limit boat damage and trampling.  <i>Adverse</i> – none	Same as Alternative B.
<b>Beaver Pond</b>	<i>Beneficial</i> - none  <i>Adverse</i> - none	Same as Alternative A.	<i>Beneficial</i> – natural hydrology restored.  <i>Adverse</i> - none
<b>Pine-dominated Forests</b>	<i>Beneficial</i> – thinning and prescribed fire would improve habitat.  <i>Adverse</i> – none	Same as Alternative A.	<i>Beneficial</i> - none  <i>Adverse</i> – cessation of thinning and prescribed fire could increase risk of disease, insects, and wildfire.
<b>Hardwood-dominated Forests</b>	No impacts expected.	<i>Beneficial</i> – habitat mapped.  <i>Adverse</i> – none	Same as Alternative A.
<b>Canebrake</b>	No impacts expected.	<i>Beneficial</i> – habitat mapped.  <i>Adverse</i> – none	Same as Alternative A.
<b>Cahaba Riverwash Herbaceous Vegetation</b>	No impacts expected.	<i>Beneficial</i> – habitat mapped.  <i>Adverse</i> – none	Same as Alternative A.
<b>Imperiled Plants and Rare Habitats</b>	No impacted anticipated.	<i>Beneficial</i> – additional surveys would provide more information.  <i>Adverse</i> – none	Same as Alternative A.

Issues	Alternative A (Current Management – No Action Alternative)	Alternative B (Proposed Alternative)	Alternative C
<b>Wildlife</b>			
<b>Birds</b>	<i>Beneficial</i> – species that utilized pine forests would benefit from improved habitat.  <i>Adverse</i> – none	Same as Alternative A.	<i>Beneficial</i> – none  <i>Adverse</i> – loss of quality or acreage of pine forests could negatively affect species that utilize those habitats.
<b>Mammals</b>	No change in abundances or diversity expected.	Same as Alternative A.	Same as Alternative A.
<b>Reptiles and Amphibians</b>	<i>Beneficial</i> – species that utilize pine forests may benefit from improved habitat conditions.  <i>Adverse</i> – none	Same as Alternative A.	<i>Beneficial</i> –none  <i>Adverse</i> – loss of quality or acreage of pine forests may negatively affect some reptile and amphibian species.
<b>Aquatic Species</b>	<i>Beneficial</i> – none  <i>Adverse</i> – continued water quality deterioration could negatively affect some species.	<i>Beneficial</i> – water quality improvements resulting from partnership efforts within the basin would be beneficial.  <i>Adverse</i> – none	Same as Alternative A.

Issues	Alternative A (Current Management – No Action Alternative)	Alternative B (Proposed Alternative)	Alternative C
<b>Threatened and Endangered Species</b>	<p><i>Beneficial</i> – none</p> <p><i>Adverse</i> – some minimal adverse effects from continued water quality deterioration expected.</p> <p>No impacts expected to gray bats.</p>	<p><i>Beneficial</i> – water quality improvements resulting from partnership efforts within the basin would be beneficial.</p> <p><i>Adverse</i> – none</p> <p>No impacts expected to gray bats.</p>	Same as Alternative A.
<b>CULTURAL RESOURCES</b>			
<b>Cultural Resources</b>	There are no known archaeological or historical resources on the refuge.	<p><i>Beneficial</i> – A complete a comprehensive historical and archaeological resource survey would be completed</p> <p><i>Adverse</i> – none</p>	There are no known archaeological or historical resources on the refuge.
<b>SOCIOECONOMIC ENVIRONMENT</b>			
<b>Socioeconomics</b>	<p><i>Beneficial</i> – some economic benefits resulting from wildlife-associated recreation and Refuge Revenue Sharing.</p> <p><i>Adverse</i> – none</p>	<p><i>Beneficial</i> – in addition to Alternative A, increased staff and added facilities would provide a boost to local economy.</p> <p><i>Adverse</i> – none</p>	Similar to Alternative B.
<b>Land Use</b>	Impacts to land use resulting from acquisition of tracts within the approved acquisition boundary would have a negligible effect on over land use in Bibb County.	Impacts to land use resulting from acquisition of tracts within the approved acquisition boundary would have a negligible effect on over land use in Bibb County.	Impacts to land use resulting from acquisition of tracts within the approved acquisition boundary would have a negligible effect on over land use in Bibb County.

Issues	Alternative A (Current Management – No Action Alternative)	Alternative B (Proposed Alternative)	Alternative C
<b>REFUGE ADMINISTRATION</b>			
<b>Staffing</b>	<p><i>Beneficial</i> – none</p> <p><i>Adverse</i> – lack of staff would continue to limit refuge operations and public use opportunities.</p>	<p><i>Beneficial</i> – additional 5 FTEs would benefit refuge operations and recreational opportunities.</p> <p><i>Adverse</i> – none</p>	Same as Alternative B.
<b>Facilities</b>	<p><i>Beneficial</i> – none</p> <p><i>Adverse</i> – lack of facilities would limit operational capability and recreational opportunities.</p>	<p><i>Beneficial</i> – office and other facilities would benefit refuge operations and public use opportunities.</p> <p><i>Adverse</i> – none</p>	Same as Alternative B.
<b>Infrastructure Maintenance</b>	<p><i>Beneficial</i> – limited benefits due to lack of staff to carry out needed maintenance of roads, trails, etc.</p> <p><i>Adverse</i> – lack of staff resulting in back-log of infrastructure maintenance, negatively affecting refuge operations and public use.</p>	<p><i>Beneficial</i> – increased infrastructure maintenance would benefit refuge operations and public use.</p> <p><i>Adverse</i> – none</p>	Same as Alternative B.
<b>VISITOR SERVICES</b>			
<b>Hunting and Fishing</b>	Hunting and fishing opportunities would continue to be provided.	Same as Alternative A.	Similar to A, except that access to fishing might decrease with River Trace Road being shortened.

Issues	Alternative A (Current Management – No Action Alternative)	Alternative B (Proposed Alternative)	Alternative C
<b>Wildlife Observation and Photography</b>	Wildlife observation and photography opportunities would continue to be provided.	Similar to Alternative A, except that benches at overlooks would be an added benefit.	Same as Alternative A.
<b>Environmental Education and Interpretation</b>	<i>Beneficial</i> – none  <i>Adverse</i> – currently, refuge offers no environmental education and limited interpretation opportunities.	<i>Beneficial</i> – increased opportunities for environmental education and interpretation.  <i>Adverse</i> – none	Same as Alternative B.
<b>Other Uses</b>	No impacts expected.	Canoe/kayak launch site would be improved.	Canoe/kayak launch site would be removed.

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## UNAVOIDABLE IMPACTS AND MITIGATION MEASURES

Under Alternative A—the no-action alternative—there are numerous unavoidable impacts, including law enforcement that is not adequate for protecting any significant visitor use; continued degradation of the biological functions of native plant communities and wildlife habitat due to the invasion of exotic plants and nuisance animals; and a continued decrease in biodiversity. Over time, if these issues are not addressed, they would continue to impact refuge resources.

Alternative B, the proposed alternative, also has some unavoidable impacts. These impacts are expected to be minor and/or short-term in duration. However, the refuge would attempt to minimize these impacts whenever possible. The following sections describe the measures the refuge would employ to mitigate and minimize the potential impacts that would result from implementation of the proposed alternative.

### *WATER QUALITY FROM SOIL DISTURBANCE AND USE OF HERBICIDES*

Soil disturbance and siltation due to road maintenance and the construction of a refuge office and other facilities is expected to be minor and of short duration. To further reduce potential impacts, the refuge would use best management practices to minimize the erosion of soils into water bodies.

Foot traffic on trails is expected to have a negligible impact on soil erosion. To minimize the impacts from public use, the refuge would include informational signs that request trail users to remain on the trails, in order to avoid causing potential erosion problems.

Long-term herbicide use for exotic plant control could result in a slight decrease in water quality in areas prone to exotic plant infestation. Through the proper application of herbicides, however, this is expected to have a minor impact on the environment, with the benefit of reducing or eliminating exotic plant infestations.

### *WILDLIFE DISTURBANCE*

Disturbance to wildlife is an unavoidable consequence of any public use program, regardless of the activity involved. While some activities such as wildlife observation may be less disturbing than others, all of the public use activities proposed under the proposed alternative would be planned to avoid unacceptable levels of impact.

The known and anticipated levels of disturbance from the proposed alternative are not considered to be significant. Nevertheless, the refuge would manage public use activities to reduce impacts. Providing access for fishing opportunities allows the use of a renewable natural resource without adversely impacting other resources. Hunting would also be managed with restrictions that ensure minimal impact on other resources. General wildlife observation may result in minimal disturbance to wildlife. If the refuge determines that impacts from the expected additional visitor uses are above the levels that are anticipated, those uses would be discontinued, restricted, or rerouted to other less sensitive areas.

### *VEGETATION DISTURBANCE*

Negative impacts could result from the maintenance of trails that require the clearing of non-sensitive vegetation along their length. This is expected to be a minor short-term impact.

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Increased visitor use may increase the potential for the introduction of new exotic species into areas when visitors do not comply with boating regulations at canoe launch areas and other access points, or with requests to stay on trails. The refuge would minimize this impact by enforcing the regulations for access to the refuge's water bodies, and by installing informational signs that request users to stay on the trails.

### *USER GROUP CONFLICTS*

As public use increases, unanticipated conflicts between different user groups could occur. If this should happen, the refuge would adjust its programs, as needed, to eliminate or minimize any public use issues. The refuge would use methods that have proven to be effective in reducing or eliminating public use conflicts. These methods include establishing separate use areas, different use periods, and limits on the numbers of users in order to provide safe, quality, appropriate, and compatible wildlife-dependent recreational opportunities.

### *EFFECTS ON ADJACENT LANDOWNERS*

Implementation of the proposed alternative is not expected to negatively affect the owners of private lands adjacent to the refuge. Positive impacts that would be expected include higher property values, less intrusion of invasive exotic plants, and increased opportunities for viewing more diverse wildlife.

However, some negative impacts that may occur include a higher frequency of trespass onto adjacent private lands, and noise associated with increased traffic. To minimize these potential impacts, the refuge would provide informational signs that clearly mark refuge boundaries; maintain the refuge's existing parking facilities; use law enforcement; and provide increased educational efforts at the visitor center.

### *LAND OWNERSHIP AND SITE DEVELOPMENT*

Land acquisition efforts by the Service could lead to changes in land use and recreational use patterns. However, most of the non-Service-owned lands within the refuge's approved acquisition boundary are currently undeveloped. If these lands are acquired as additions to the refuge, they would be maintained in a natural state, managed for native wildlife populations, and opened to wildlife-compatible public uses, where feasible.

Potential development of the refuge's buildings, trails, and other improvements could lead to minor short-term negative impacts on plants, soils, and some wildlife species. When building the observation towers, efforts would be made to use recycled products and environmentally sensitive treated lumber. The visitor center would be constructed to be aesthetically pleasing to the community and to avoid any additional impacts to native plant communities. All construction activities would comply with the requirements of Section 404 of the Clean Water Act; the National Historic Preservation Act; Executive Order 11988, Floodplain Management; and other applicable regulatory requirements.

### **CUMULATIVE IMPACTS**

A cumulative impact is defined as an impact on the natural or human environment, which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7).

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Cumulative impacts are the overall, net effects on a resource that arise from multiple actions. Impacts can “accumulate” spatially, when different actions affect different areas of the same resource. They can also accumulate over the course of time, from actions in the past, the present, and the future. Occasionally, different actions counterbalance one another, partially canceling out each other’s effect on a resource. But more typically, multiple effects add up, with each additional action contributing an incremental impact on the resource. In addition, sometimes the overall effect is greater than merely the sum of the individual effects, such as when one more reduction in a population crosses a threshold of reproductive sustainability, and threatens to extinguish the population.

A thorough analysis of impacts always considers their cumulative aspects, because actions do not take place in a vacuum: there are virtually always some other actions that have affected that resource in some way in the past, or are affecting it in the present, or would affect it in the reasonably foreseeable future. So any assessment of a specific action’s effects must in fact be made with consideration of what else has happened to that resource, what else is happening, or what else will likely happen to it.

According to the CEQ regulations on implementing NEPA (40 CFR 1508.7), a cumulative impact is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes the other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time. This cumulative impacts assessment includes the actions of other agencies or organizations, if they are interrelated and influence the same environment. Therefore, this analysis considers the interaction of activities at the refuge with other actions occurring over a larger spatial and temporal frame of reference.

### ***Cumulative Impacts on the Physical Environment***

#### *Climate Change*

We expect there to be cumulative positive effects on air quality through the restoration of habitats. Although the refuge would continue to use prescribed fires for maintaining certain habitats, we anticipate that air quality impacts associated with those actions would be temporary and localized. With respect to climate change, we believe that the refuge would be a net carbon sink over the 15-year planning period, with Alternative B likely having the greatest sequestration capacity due to the reduced risk of insect damage, disease, and catastrophic wildfire in pine forests. The amount of carbon that would potentially be released by the refuge as a result of associated energy use was not estimated for this EA. However, under each alternative, the refuge would continue to lower its carbon emissions. As part of the effort to implement many of the strategies for achieving Service-wide carbon neutrality by 2020 (USFWS 2010), refuge energy use is expected to decline. These actions would include conversion to hybrid vehicles, upgrading energy efficiencies in facilities, video-conferencing, and green purchasing. These actions, combined with those of other Service offices and the Federal Government in general, would likely result in a beneficial reduction in the rate of greenhouse gas emissions nationally.



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In terms of preparing for the predicted impacts of climate change, each management alternative, but especially Alternative B, would contribute to increasing resiliency and redundancy in the landscape. By incorporating strategies that improve the ability of an area to adapt to more extreme weather events and shifting climate zones which are important components of the response to this crisis, as recommended in various reports:

- Climate Change 2007: Impacts, Adaptation and Vulnerability (Intergovernmental Panel on Climate Change 2007)
- Rising to the Challenge: Strategic Plan for Responding to Accelerating Climate Change (USFWS 2010)

### *Water Quality and Soils*

We predict no major, adverse, cumulative impacts on water quality and soils under any of the alternatives. We would use BMPs on any roads, trails, or other infrastructure construction sites to ensure potential impacts are avoided or minimized. Any forest management that would take place would be such that all BMPs are followed and monitored closely. All projects are few, and dispersed on the refuge, so their local effects would not be additive. Under Alternatives B and C, partnerships within the watershed could help improve water quality.

### *Air Quality*

Minimal amounts of pollutants would be emitted through operational and recreational motor vehicle use on the refuge. Some pollutants would be emitted as a result of prescribed fire operations under Alternatives A and B. Under Alternative C, lack of prescribed fire could result in catastrophic wildfire with substantial amounts of pollutants being emitted. None of the alternative would have any significant cumulative effect on air quality.

### *Noise*

No cumulative impacts to noise are anticipated as a result of any of the alternatives.

### ***Cumulative Impacts on the Biological Environment***

Each of the alternatives would maintain or improve biological resources on the refuge. The combination of our management actions with our state, federal, non-governmental organizations, and university partners would likely result in significant, beneficial cumulative effects by

- increasing protection and management for federal- and state-listed threatened and endangered species;
- reducing invasive species; and
- improving water quality.

Habitat improvements under the alternatives should benefit rare or declining species and species listed as threatened or endangered. Invasive species monitoring and control efforts would limit the spread of these exotics.

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Under each alternative, we would continue to allow activities (hunting, fishing access) that result in the direct loss of individual wildlife. The site-specific impacts of these programs are described earlier in this chapter and in Appendix F, “Compatibility Determinations.” In the Service’s professional judgment and experience, those programs would not cause a significant cumulative effect on the respective populations of the wildlife species harvested, for reasons discussed below.

In much of the southeast, deer populations continue to increase and have reached densities in some areas that are above the carrying capacity of the habitat. A deer harvest is essential in helping to maintain the herd at or below the carrying capacity of its habitat. When deer overpopulate, they over-browse their habitat, and can completely change the species composition of a forest, in addition to reducing its overall biodiversity (Goetsch et al. 2011). Tree seedlings can be killed by over-browsing, limiting recruitment. The failure of forests to regenerate due to over-browsing by deer would have negative impacts on future resident and migratory populations of native wildlife, including deer. Over-browsing by deer can also affect nesting songbirds in upland areas. Additionally, deer overpopulation can lead to epidemics such as hemorrhagic disease, bluetongue, and chronic wasting disease. Furthermore, overpopulation leads to starvation, more numerous car-deer collisions, and poorer herd health overall. Regulated hunting has proven to be an effective deer population management tool and has been shown to be the most efficient and least expensive technique for removing deer and maintaining deer at desired levels (Stribling 1996).

Deer have restricted home ranges and local hunting efforts would not affect regional populations. Deer densities are approximately 30 deer per-square-mile, which is about average for Alabama (Cook and Gray 2003). This information confirms that decades of deer hunting on the refuge and surrounding state and private lands has not had a local cumulative adverse effect on the deer population. Therefore, continuing to allow hunting on the refuge should not have negative cumulative impacts on the deer herd; but instead, should support better overall herd health and maintain or increase habitat biodiversity.

Fishing would not have a significant cumulative impact on the species taken. None of the rare species found in the river are likely to be taken by anglers. Fished species consist of locally reproducing populations and their take would not comprise a regional impact.

Priority public use opportunities that do not include the direct take of fish and wildlife (wildlife observation, wildlife photography, and environmental education) would continue under each alternative. Each of these activities has some level of disturbance to wildlife associated with them, even though they occur on a relatively limited area of the refuge (trails, refuge roads, etc.). Breeding and nesting birds can be affected, affecting productivity. Likewise, resting or foraging birds that are using the refuge during their migration could also be disturbed, negatively affecting their energetics. During migration, birds have limited energy (fat) reserves and a reduction in resting or foraging opportunities due to human disturbance can increase their risk of mortality due to exhaustion or starvation. However, cumulatively, these impacts are not expected to be significant as levels of disturbance are expected to be of low intensity and limited to a relatively small area of the refuge.

### ***Cumulative Impacts on the Socioeconomic Environment***

Cumulative impacts on the socioeconomic environment are not expected to be significant under any of the alternatives.

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### ***Cumulative Impacts on the Cultural resources***

The overall cumulative effect of each alternative is expected to increase the protection and interpretation of cultural resources on the refuge.

The implementation of the alternatives includes actions relating to facility development, wildlife habitat and population management, resource protection, public use, and administrative programs. These actions would have both direct and indirect effects (e.g., facility development results in increased public use, which increases littering, noise, and vehicular traffic); however, the cumulative negative effects of these actions over the 15-year planning period would not be significant and are far outweighed by the anticipated positive impacts. The refuge is not aware of any past, present, or future planned actions that would result in a significant cumulative impact when added to the refuge's proposed actions, as outlined in the proposed alternative.

### **DIRECT AND INDIRECT EFFECTS OR IMPACTS**

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

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

### **SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY**

NEPA Section 102(C)(iv) (CEQ regulations Part 1502.16) requires federal agencies to disclose the relationship between local short-term uses of the human environment and the maintenance and enhancement of long-term productivity. The Service expects that the proposed alternatives would lead to long-term productivity through the life of the CCP (15 years). This discussion focuses on the tradeoffs between short-term environmental costs and long-term environmental benefits.

In this section, we consider the relationship between local, short-term uses of the human environment and maintaining the long-term productivity of the environment. By long-term, we mean that the impact would extend beyond the 15-year period of the CCP.

Under all of the alternatives, our primary aim is to maintain or enhance the long-term productivity and sustainability of natural resources on the refuge, migratory birds and other far-ranging species, across the whole range of each of the species.

Habitat protection and restoration actions across all alternatives often entail short-term negative impacts to ensure the long-term productivity of the refuge. Many of the cyclic management actions in the alternatives, namely prescribed burning and controlling invasive plants and animals, can have dramatic short-term impacts. Those include the direct mortality of some plants and animals, the displacement of species, and the temporary displacement or cessation of certain types of public use. However, the near-term and long-term benefits of those actions offset their short-term impacts, practices that often mimic the natural and thus sustainable processes necessary for long-term habitat health. These are described in more detail earlier in this chapter, under their applicable issues or concerns.

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As discussed in “Impacts on Public Use,” the short-term disruption that habitat management causes in the current means, locations, and timing of public uses, should, in the long term, help sustain the greatest diversity of opportunity for the greatest number of people. In addition, diverse opportunities for public use should provide the best long-term positive economic impact on local communities. That mirrors the widely accepted premise that maintaining diversity in natural systems helps ensure their long-term resiliency. The refuge would design proposed programs in outreach and environmental education to explain Service actions and what some may perceive as inconveniences to visitors may encourage visitors to be better stewards of our environment.

In summary, it is predicted that the alternatives would contribute positively in maintaining or enhancing the long-term productivity of the environment with minimal inconvenience or loss of opportunity for the American public.

### **Potential Irreversible and Irrecoverable Commitments of resources**

NEPA Section 102(C)(v) (CEQ regulations Part 1502.16) requires federal agencies to consider any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Irreversible commitments of resources are those that cannot be undone, except perhaps in the extreme long-term. One example is an action that contributes to a species’ extinction. Once extinct, it can never be replaced and is an irreversible loss. By comparison, irretrievable commitments of resources are those that are lost for an extended period of time, but could be undone given sufficient time and resources, although there may be a loss in productivity or use for a time. An example of an irretrievable commitment is converting what was once a mature forest and actively managing and maintaining it in an early successional forest habitat condition. If, for some reason, that early successional forest habitat was no longer an objective, those acres could progress gradually to mature forest again over a period of 70 or more years, or it could be determined best to expedite that reversion by planting shrubs and trees and controlling invasive plants.

The Service does not believe there are any actions proposed under any alternative that are irreversible. With regards to irretrievable actions, only a few examples fall into this category and primarily relate to the maintenance of roads and trails.

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## V. Consultation and Coordination

### OVERVIEW

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

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

The planning process began in October 2011, with various data-gathering sessions. As part of that process, the Service reviewed approved step-down plans, a visitor services review, GIS data, species' lists, and other information pertinent to the development of a CCP.

An intergovernmental scoping meeting was held on May 8, 2012, at Tannehill Ironworks State Park. In addition to various tribes, several federal, state, and local agencies were invited. A total of 13 people, including Service staff, participated. Other government agencies represented included the Alabama Department of Conservation and Natural Resources (Alabama Aquatic Biodiversity Center and Alabama Wildlife and Freshwater Fisheries Division), Alabama Forestry Commission, and USDA Forest Service. The purpose of the meeting was to develop a list of issues and opportunities to be addressed in the Draft CCP/EA.

ESA Section 7 consultation was conducted during the course of the project to determine the impacts, if any, on threatened and/or endangered species from the implementation of the Final CCP.



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## APPENDICES

### *Appendix A. Glossary*

- Adaptive Management:** Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in 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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<b>Comprehensive Conservation Plan:</b>	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).
<b>Concern:</b>	See Issue
<b>Cover Type:</b>	The present vegetation of an area.
<b>Cultural Resource Inventory:</b>	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).
<b>Cultural Resource Overview:</b>	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).
<b>Cultural Resources:</b>	The remains of sites, structures, or objects used by people in the past.
<b>Designated Wilderness Area:</b>	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).
<b>Disturbance:</b>	Significant alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., aircraft overflight).
<b>Ecosystem:</b>	A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.
<b>Ecosystem Management:</b>	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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<b>Endangered Species (Federal):</b>	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.
<b>Endangered Species (State):</b>	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.
<b>Environmental Assessment (EA):</b>	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).
<b>Environmental Impact Statement (EIS):</b>	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).
<b>Estuary:</b>	The wide lower course of a river into which the tides flow. The area where the tide meets a river current.
<b>Finding of No Significant Impact (FONSI):</b>	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).
<b>Goal:</b>	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).
<b>Habitat:</b>	Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.
<b>Habitat Restoration:</b>	Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy ecosystems.
<b>Habitat Type:</b>	See Vegetation Type.
<b>Indicator Species</b>	A species whose abundance in a given area is believed to indicate certain environmental or ecological conditions or suitable conditions for a group of other species.

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<b>Integrated Pest Management (IPM)</b>	A sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks.
<b>Improvement Act:</b>	The National Wildlife Refuge System Improvement Act of 1997.
<b>Informed Consent:</b>	The grudging willingness of opponents to “go along” with a course of action that they actually oppose (Bleiker).
<b>Issue:</b>	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)].
<b>Management Alternative:</b>	See Alternative
<b>Management Concern:</b>	See Issue
<b>Management Opportunity:</b>	See Issue
<b>Migration:</b>	The seasonal movement from one area to another and back.
<b>Mission Statement:</b>	Succinct statement of the unit’s purpose and reason for being.
<b>Monitoring:</b>	The process of collecting information to track changes of selected parameters over time.
<b>National Environmental Policy Act of 1969 (NEPA):</b>	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).
<b>National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57):</b>	Under the Improvement Act, the Fish and Wildlife Service is required to develop 15-year comprehensive conservation plans for all national wildlife refuges outside Alaska. The Act also describes the six public uses given priority status within the Refuge System (i.e., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation).

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<b>National Wildlife Refuge System Mission:</b>	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.
<b>National Wildlife Refuge System:</b>	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.
<b>National Wildlife Refuge:</b>	A designated area of land, water, or an interest in land or water within the Refuge System.
<b>Native Species:</b>	Species that normally live and thrive in a particular ecosystem.
<b>Noxious Weed:</b>	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.
<b>Objective:</b>	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).
<b>Plant Association:</b>	A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.
<b>Plant Community:</b>	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.
<b>Preferred Alternative:</b>	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.

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<b>Prescribed Fire:</b>	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.
<b>Priority Species:</b>	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.
<b>Public Involvement Plan:</b>	Broad long-term guidance for involving the public in the comprehensive conservation planning process.
<b>Public Involvement:</b>	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.
<b>Public:</b>	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.
<b>Purposes of the Refuge:</b>	“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).
<b>Recommended Wilderness:</b>	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).

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<b>Record of Decision (ROD):</b>	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).
<b>Refuge Goal:</b>	See Goal
<b>Refuge Purposes:</b>	See Purposes of the Refuge
<b>Songbirds:</b> (Also Passerines)	A category of birds that is medium to small, perching landbirds. Most are territorial singers and migratory.
<b>Step-down Management Plan:</b>	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).
<b>Strategy:</b>	A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.6 U).
<b>Study Area:</b>	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.
<b>Threatened Species (Federal):</b>	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.
<b>Threatened Species (State):</b>	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.
<b>Tiering:</b>	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).
<b>U.S. Fish and Wildlife Service Mission:</b>	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.
<b>Unit Objective:</b>	See Objective

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**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)

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## ACRONYMS AND ABBREVIATIONS

ADEM	Alabama Department of Environmental Management
ADIR	Alabama Department of Industrial Relations
ADWFF	Alabama Division of Wildlife and Freshwater Fisheries
AGO	America's Great Outdoors
AOS	Alabama's Ornithological Society
ATV	All-terrain Vehicle
AWW	Alabama Water Watch
BIDEH	Biological Integrity, Diversity, and Environmental Health
BMP	Best Management Practice
CAA	Clean Air Act
CCP	Comprehensive Conservation Plan
CFR	Code of Federal Regulations
cfs	cubic feet per second
CLEAN	Children Linking with the Environment across the Nation
DO	Dissolved Oxygen
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
FAWN	Forestry Awareness Week Now
FR	Federal Register
FTE	full-time equivalent
FWS	U.S. Fish and Wildlife Service (also Service)
FONSI	Finding of No significant Impact
FY	Fiscal Year
GCN	Greatest Conservation Need
GHG	Greenhouse Gas
GIS	Global Information System
HUC	Hydrologic Unit Code
IMP	Inventory and Monitoring
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
LCC	Landscape Conservation Cooperative
NAAQS	National Ambient Air Quality Standards
NAWMP	North American Waterfowl Management Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
PFT	Permanent Full Time
PIF	Partners in Flight
RM	Refuge Manual
RNA	Research Natural Area
ROD	Record of Decision

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**ACRONYMS AND ABBREVIATIONS** *(Cont'd)*

RONs	Refuge Operating Needs System
SARP	Southeast Aquatic Resources Partnership
SHC	Strategic Habitat Conservation
SHPO	State Historic Preservation Office
TFT	Temporary Full Time
USC	United States Code
USGS	U.S. Geological Survey
WMA	Wildlife Management Area



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## Appendix C. Relevant Legal Mandates and Executive Orders

STATUTE	DESCRIPTION
<i>Administrative Procedures Act (1946)</i>	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.
<i>American Antiquities Act of 1906</i>	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.
<i>American Indian Religious Freedom Act of 1978</i>	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.
<i>Americans With Disabilities Act of 1990</i>	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.
<i>Anadromous Fish Conservation Act of 1965, as amended</i>	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.
<i>Archaeological Resources Protection Act of 1979, as amended.</i>	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.
<i>Architectural Barriers Act of 1968</i>	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.
<i>Bald and Golden Eagle Protection Act of 1940, as amended</i>	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.

STATUTE	DESCRIPTION
<i>Bankhead-Jones Farm Tenant Act of 1937</i>	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.
<i>Cave Resources Protection Act of 1988</i>	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.
<i>Clean Air Act of 1970</i>	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.
<i>Clean Water Act of 1974, as amended</i>	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.
<i>Coastal Barrier Resources Act of 1982 (CBRA)</i>	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.
<i>Coastal Barrier Improvement Act of 1990</i>	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.
<i>Coastal Wetlands Planning, Protection, and Restoration (1990)</i>	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.



STATUTE	DESCRIPTION
<i>Coastal Zone Management Act of 1972, as amended</i>	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.
<i>Emergency Wetlands Resources Act of 1986</i>	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.
<i>Endangered Species Act of 1973, as amended</i>	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.
<i>Environmental Education Act of 1990</i>	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.
<i>Estuary Protection Act of 1968</i>	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.

STATUTE	DESCRIPTION
<i>Estuaries and Clean Waters Act of 2000</i>	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.
<i>Food Security Act of 1985, as amended (Farm Bill)</i>	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.
<i>Farmland Protection Policy Act of 1981, as amended</i>	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.
<i>Federal Advisory Committee Act (1972), as amended</i>	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.
<i>Federal Coal Leasing Amendment Act of 1976</i>	Provided that nothing in the Mining Act, the Mineral Leasing Act, or the Mineral Leasing Act for Acquired Lands authorized mining coal on refuges.
<i>Federal-Aid Highways Act of 1968</i>	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.
<i>Federal Noxious Weed Act of 1990, as amended</i>	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.

STATUTE	DESCRIPTION
<i>Fish and Wildlife Act of 1956</i>	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.
<i>Fish and Wildlife Conservation Act of 1980, as amended</i>	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.
<i>Fish and Wildlife Coordination Act of 1958</i>	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.
<i>Improvement Act of 1978</i>	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.
<i>Fishery (Magnuson) Conservation and Management Act of 1976</i>	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.
<i>Freedom of Information Act, 1966</i>	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.
<i>Geothermal Steam Act of 1970, as amended</i>	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.

STATUTE	DESCRIPTION
<i>Lacey Act of 1900, as amended</i>	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.
<i>Land and Water Conservation Fund Act of 1948</i>	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.
<i>Marine Mammal Protection Act of 1972, as amended</i>	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.
<i>Migratory Bird Conservation Act of 1929</i>	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.
<i>Migratory Bird Hunting and Conservation Stamp Act of 1934</i>	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.
<i>Migratory Bird Treaty Act of 1918, as amended</i>	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.
<i>Mineral Leasing Act for Acquired Lands (1947), as amended</i>	Authorizes and governs mineral leasing on acquired public lands.

STATUTE	DESCRIPTION
<i>Minerals Leasing Act of 1920, as amended</i>	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.
<i>Mining Act of 1872, as amended</i>	Authorizes and governs prospecting and mining for the so-called “hardrock” minerals (i.e., gold and silver) on public lands.
<i>National and Community Service Act of 1990</i>	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.
<i>National Environmental Policy Act of 1969</i>	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.
<i>National Historic Preservation Act of 1966, as amended</i>	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.
<i>National Trails System Act (1968), as amended</i>	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.
<i>National Wildlife Refuge System Administration Act of 1966</i>	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.

STATUTE	DESCRIPTION
<i>National Wildlife Refuge System Improvement Act of 1997</i>	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.
<i>Native American Graves Protection and Repatriation Act of 1990</i>	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.
<i>Neotropical Migratory Bird Conservation Act of 2000</i>	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.
<i>North American Wetlands Conservation Act of 1989</i>	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).
<i>Refuge Recreation Act of 1962, as amended</i>	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.
<i>Partnerships for Wildlife Act of 1992</i>	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.

STATUTE	DESCRIPTION
<i>Refuge Revenue Sharing Act of 1935, as amended</i>	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.
<i>Rehabilitation Act of 1973</i>	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.
<i>Rivers and Harbors Appropriations Act of 1899, as amended</i>	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.
<i>Sikes Act (1960), as amended</i>	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.
<i>Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948</i>	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.
<i>Transportation Equity Act for the 21st Century (1998)</i>	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.
<i>Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended</i>	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.

STATUTE	DESCRIPTION
<i>Water Resources Planning Act of 1965</i>	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.
<i>Wild and Scenic Rivers Act of 1968, as amended</i>	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.
<i>Wilderness Act of 1964, as amended</i>	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.
<i>Youth Conservation Corps Act of 1970</i>	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
<i>EO 11593, Protection and Enhancement of the Cultural Environment (1971)</i>	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.
<i>EO 11644, Use of Off-road Vehicles on Public Land (1972)</i>	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.
<i>EO 11988, Floodplain Management (1977)</i>	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.”
<i>EO 11989 (1977), Amends Section 2 of EO 11644</i>	Directs agencies to close areas negatively impacted by off-road vehicles.
<i>EO 11990, Protection of Wetlands (1977)</i>	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.
<i>EO 12372, Intergovernmental Review of Federal Programs (1982)</i>	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.
<i>EO 12898, Environmental Justice (1994)</i>	Requires federal agencies to identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations.

EXECUTIVE ORDERS	DESCRIPTIONS
<p><i>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.</i></p>	<p>Recommended that the executive branch develop, in cooperation with state, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data. Of particular importance to 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.</p>
<p><i>EO 12962, Recreational Fisheries (1995)</i></p>	<p>Federal agencies are directed to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities in cooperation with states and tribes.</p>
<p><i>EO 13007, Native American Religious Practices (1996)</i></p>	<p>Provides for access to, and ceremonial use of, Indian sacred sites on federal lands used by Indian religious practitioners and direction to avoid adversely affecting the physical integrity of such sites.</p>
<p><i>EO 13061, Federal Support of Community Efforts Along American Heritage Rivers (1997)</i></p>	<p>Established the American Heritage Rivers initiative for the purpose of natural resource and environmental protection, economic revitalization, and historic and cultural preservation. The Act directs Federal agencies to preserve, protect, and restore rivers and their associated resources important to our history, culture, and natural heritage.</p>
<p><i>EO 13084, Consultation and Coordination With Indian Tribal Governments (2000)</i></p>	<p>Provides a mechanism for establishing regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications.</p>
<p><i>EO 13112, Invasive Species (1999)</i></p>	<p>Federal agencies are directed to prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, accurately monitor invasive species, provide for restoration of native species and habitat conditions, conduct research to prevent introductions and to control invasive species, and promote public education on invasive species and the means to address them. This EO replaces and rescinds EO 11987, Exotic Organisms (1977).</p>

EXECUTIVE ORDERS	DESCRIPTIONS
<p><i>EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. (2001)</i></p>	<p>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.</p>



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## Appendix D. Public Involvement

### SUMMARY OF PUBLIC SCOPING COMMENTS

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

#### *FISH AND WILDLIFE POPULATION MANAGEMENT*

Interagency Comments:

- Monitoring of threatened and endangered species is needed

Public Comments:

- Refuge habitat should be assessed for possible reintroduction of threatened and endangered mussels and snails.

#### *HABITAT MANAGEMENT*

Interagency Comments:

- Habitat Management Plan is needed with longleaf restoration as a priority
- Fire management, including wildfire and smoke management
- Invasive organisms are a problem on the refuge.
- Taro or coco yam (*Colocasia esculenta*) is expanding and has the potential to smother native streamside vegetation.

Public Comments: None

#### *RESOURCE PROTECTION*

Interagency Comments:

- The Service should more actively pursue buying land within the acquisition boundary from willing sellers.
- Water Quality: The refuge should work with cities upstream and non-governmental organizations to help improve water quality of the Cahaba River.
- Longleaf habitat connectivity (through private lands and partners)

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Public Comments:

- The Service should more actively pursue buying land within the acquisition boundary from willing sellers.

*VISITOR SERVICES*

Interagency Comments:

- River Trace Road Issues: Traffic, erosion
- Manage access (Service vs. public; foot and vehicle)
- Limited access to eastern/southern portion of the refuge
- Concern regarding archery only hunting.
- Concern as to why waterfowl hunting is not allowed

Public Comments:

- Organize picnics to draw visitors.
- Refuge needs bathrooms.
- Camping should be allowed.
- Some people think the refuge is closed at night.
- Refuge needs more educational programs.
- Bring in speakers.
- Refuge could bring more visitors that spend their money in Bibb County.
- Visitors could combine their visit with West Blocton Coke Ovens Park and/or Tannehill Ironworks Historical Park.
- Expand River Trace Road to create a wildlife drive.
- Erosion along River Trace Road is making it too narrow and unsafe.
- A segment of the public would like to see gun hunting allowed on the refuge.
- Traffic is an issue on River Trace Road, especially since there are many segments where it is too narrow for cars to safely pass in opposite directions.
- The lack of waterfowl hunting on the refuge is a concern to some members of the public.
- Areas that have heavy public use (e.g., swimming holes) need greater oversight and a more frequent law enforcement presence.
- There are locations where 4-wheel vehicles are damaging vegetation in order to park.
- Some nearby landowners are concerned about the public accessing their properties via the refuge; especially if additional parcels are acquired by the refuge in the future.

*REFUGE ADMINISTRATION*

Interagency Comments:

- Lack of staff

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Public Comments:

- Consider having Belcher Road going around the hill (to reduce maintenance).
- Water bars on Belcher Road are being breached because gravel is blocking them.
- The lack of staff is hindering adequate refuge management.
- Some roads need more gravel.
- Fire/smoke management is a problem for an un-staffed refuge.





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## *Appendix E. Appropriate Use Determinations*

### **Cahaba River National Wildlife Refuge Appropriate Use Determinations**

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

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

- Six wildlife-dependent recreational uses - As defined by the National Wildlife Refuge System Improvement Act of 1997, the six wildlife-dependent recreational uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) are determined to be appropriate. However, the refuge manager must still determine if these uses are compatible.
- Take of fish and wildlife under state regulations - States have regulations concerning take of wildlife that includes hunting, fishing, and trapping. The Service considers take of wildlife under such regulations appropriate. However, the refuge manager must determine if the activity is compatible before allowing it on a refuge.

#### **Statutory Authorities for this policy:**

**National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd-668ee.** This law provides the authority for establishing policies and regulations governing refuge uses, including the authority to prohibit certain harmful activities. The Act does not authorize any particular use, but rather authorizes the Secretary of the Interior to allow uses only when they are compatible and “under such regulations as he may prescribe.” This law specifically identifies certain public uses that, when compatible, are legitimate and appropriate uses within the Refuge System. The law states “. . . it is the policy of the United States that . . . compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System . . . compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management; and . . . when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated . . . the Secretary shall . . . ensure that priority general public uses of the System receive enhanced consideration over other general public uses in planning and management within the System . . . .” The law also states “in administering the System, the Secretary is authorized to take the following actions: . . . issue regulations to carry out this Act.” This policy implements the standards set in the Act by providing enhanced consideration of priority general public uses and ensuring other public uses do not interfere with our ability to provide quality, wildlife-dependent recreational uses.

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**Refuge Recreation Act of 1962, 16 U.S.C. 460k.** The Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

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

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

**Definitions:**

Appropriate Use

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

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

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

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

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

- Promotes safety of participants, other visitors, and facilities.
- Promotes compliance with applicable laws and regulations and responsible behavior.
- Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives in a plan approved after 1997.
- Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation.
- Minimizes conflicts with neighboring landowners.
- Promotes accessibility and availability to a broad spectrum of the American people.
- Promotes resource stewardship and conservation.

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- Promotes public understanding and increases public appreciation of America's natural resources and the Service's role in managing and protecting these resources.
  - Provides reliable/reasonable opportunities to experience wildlife.
  - Uses facilities that are accessible and blend into the natural setting.
  - Uses visitor satisfaction to help define and evaluate programs.

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

## FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cahaba River National Wildlife Refuge

Use: Bicycling

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

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

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

If indicated, the refuge manager has consulted with State fish and wildlife agencies.      **Yes** X **No** \_\_\_\_

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

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

**Not Appropriate** \_\_\_\_\_

**Appropriate** X

Refuge Manager: \_\_\_\_\_

Date: \_\_\_\_\_

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

Refuge Supervisor: \_\_\_\_\_

Date: \_\_\_\_\_

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

## FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name:           Cahaba River National Wildlife Refuge          

Use:           Horseback Riding          

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

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

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

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

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

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

**Not Appropriate**   X                        **Appropriate**   

Refuge Manager: \_\_\_\_\_ Date: \_\_\_\_\_

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

Refuge Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_

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

## FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cahaba River National Wildlife Refuge

Use: Canoeing

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

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

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

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

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

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

**Not Appropriate**     

**Appropriate** X     

Refuge Manager: \_\_\_\_\_

Date: \_\_\_\_\_

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

Refuge Supervisor: \_\_\_\_\_

Date: \_\_\_\_\_

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

## FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name:           Cahaba River National Wildlife Refuge          

Use:           Camping          

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

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

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

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

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

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

**Not Appropriate**   X        **Appropriate**     

Refuge Manager: \_\_\_\_\_ Date: \_\_\_\_\_

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

Refuge Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_

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

## FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cahaba River National Wildlife Refuge

Use: Off -Road Vehicles

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

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

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

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

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

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

**Not Appropriate** X

**Appropriate**     

Refuge Manager: \_\_\_\_\_

Date: \_\_\_\_\_

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

Refuge Supervisor: \_\_\_\_\_

Date: \_\_\_\_\_

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



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## FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name:           Cahaba River National Wildlife Refuge          

Use:           Research Studies and Scientific Collection          

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

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

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

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

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

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

**Not Appropriate**    

**Appropriate**   x  

Refuge Manager: \_\_\_\_\_

Date: \_\_\_\_\_

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

Refuge Supervisor: \_\_\_\_\_

Date: \_\_\_\_\_

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

## FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cahaba River National Wildlife Refuge

Use: Commercial Forest Management Operations

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

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

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

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

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

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

**Not Appropriate**   

**Appropriate** X

Refuge Manager: \_\_\_\_\_

Date: \_\_\_\_\_

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

Refuge Supervisor: \_\_\_\_\_

Date: \_\_\_\_\_

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

## FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cahaba River National Wildlife Refuge

Use: Commercial Wildlife and Nature Filming

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

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

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

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

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

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

**Not Appropriate** X

**Appropriate**    

Refuge Manager: \_\_\_\_\_

Date: \_\_\_\_\_

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

Refuge Supervisor: \_\_\_\_\_

Date: \_\_\_\_\_

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

## FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name:           Cahaba River National Wildlife Refuge          

Use:           Firewood Cutting for Personal Use Only          

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

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

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

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

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

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

**Not Appropriate**   X                        **Appropriate**   

Refuge Manager: \_\_\_\_\_ Date: \_\_\_\_\_

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

Refuge Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_

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



## FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Cahaba River National Wildlife Refuge

Use: Competitive Races with a Natural Resource Interpretation Component

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

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

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

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

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

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

**Not Appropriate** X

**Appropriate** X

Refuge Manager: \_\_\_\_\_

Date: \_\_\_\_\_

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

Refuge Supervisor: \_\_\_\_\_

Date: \_\_\_\_\_

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

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## Appendix F. Compatibility Determinations

### Cahaba River National Wildlife Refuge Compatibility Determination

**Uses:** The following uses were found to be appropriate and evaluated to determine their compatibility with the mission of the Refuge System and the purposes of the refuge.

1. Fishing
2. Big Game and Upland Game Hunting
3. Wildlife Observation and Photography
4. Environmental Education and Interpretation
5. Bicycling
6. Canoeing
7. Research Studies and Scientific Collection
8. Commercial Forest Management Operations

**Refuge Name:** Cahaba River National Wildlife Refuge.

**Date Established:** October 19, 2000.

**Establishing and Acquisition Authority(ies):** The Cahaba River National Wildlife Refuge Establishment Act, P.L. No. 106-331, Endangered Species Act of 1973, National Wildlife Refuge System Administration Act of 1966

**Refuge Purpose:** (1) conserve, enhance, and restore the native aquatic and terrestrial community characteristics of the Cahaba River (including associated fish, wildlife, and plant species); (2) conserve, enhance, and restore habitat to maintain and assist in the recovery of animals and plants that are listed under the Endangered Species Act of 1973 (16 U.S.C. 1331 et seq.); (3) in providing opportunities for compatible fish- and wildlife- oriented recreation, ensure that hunting, fishing, wildlife observation and photography, and environmental education and interpretation are the priority general public uses of the Refuge, in accordance with section 4(a)(3) and of the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668ee(a)(3), (4)); and (4) encourage the use of volunteers and to facilitate partnerships among the United States Fish and Wildlife Service, local communities, conservation organizations, and other non-federal entities to promote public awareness of the resources of the Cahaba River National Wildlife Refuge and the National Wildlife Refuge System and public participation in the conservation of those resources. V114 STAT. 1304-1305, dated October 19, 2000.

### National Wildlife Refuge System Mission:

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

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

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## Other Applicable Laws, Regulations, and Policies:

Antiquities Act of 1906 (34 Stat. 225)  
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)  
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)  
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)  
Criminal Code Provisions of 1940 (18 U.S.C. 41)  
Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250)  
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)  
Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat. 1119)  
Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)  
Wilderness Act (16 U.S.C. 1131; 78 Stat. 890)  
Land and Water Conservation Fund Act of 1965  
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)  
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)  
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)  
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)  
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)  
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)  
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)  
Emergency Wetlands Resources Act of 1986 (S.B. 740)  
North American Wetlands Conservation Act of 1990  
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)  
The Property Clause of the U.S. Constitution Article IV 3, Clause 2  
The Commerce Clause of the U.S. Constitution Article 1, Section 8  
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)  
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System. March 25, 1996  
Title 50, Code of Federal Regulations, Parts 25-33  
Archaeological Resources Protection Act of 1979  
Native American Graves Protection and Repatriation Act of 1990

Compatibility determinations for each description listed were considered separately. Although for brevity, the preceding sections from “Uses” through “Other Applicable Laws, Regulations and Policies” and the succeeding sections, “Literature Cited,” “Public Review,” and the “Approval of Compatibility Determinations” are only written once within the Draft CCP/EA, they are part of each descriptive use and become part of that compatibility determination if considered outside of the Final CCP.



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## **Use: Fishing**

### **Description of Use: Fishing**

Fishing is one of six wildlife-dependent, priority public uses of the National Wildlife Refuge System. The refuge is the only public access point for fishing for approximately 30 river miles. Lands within the refuge have been used by anglers to access the Cahaba River for several years prior to refuge establishment. Local interest in these activities is high and estimates are 4,000 fishing visits annually. This high-priority public use would be expanded as resources and demand permit.

Access to the Cahaba River currently occurs over an existing graveled, single lane road. The road is supports two-way traffic along a portion of its length, but several lengths of the road support only one-way traffic, with pull-outs for passing. Constant maintenance or an alternate route to access the lower reaches of the Cahaba River would be necessary in the future.

Fishing could occur anywhere along the Cahaba River within the current refuge boundaries. As additional areas are acquired they would be evaluated to determine their suitability for this activity.

Access to many areas is limited due to ongoing acquisition. As more lands are purchased within the refuge acquisition boundary, additional access may be provided.

Fishing is allowed during posted refuge hours and subject to federal, state and refuge-specific regulations on the Cahaba River. Camping and use of ATVs is not allowed.

### **Availability of Resources:**

Approximately \$5,000 of staff time and \$13,000 of other operations and maintenance funding would be needed to administer this use.

Cahaba River NWR currently is unstaffed and complexed with Wheeler NWR. The refuge has no law enforcement or administrative staff on-site and relies on Wheeler NWR's law enforcement and administrative staffs to meet these obligations. Cahaba River NWR currently has no maintenance staff, but uses outside contracts and Wheeler NWR maintenance staff to meet increased maintenance needs.

River Road, leading to the Cahaba River on the refuge, needs several improvements:

1. The launch and fishing area at the Cahaba River needs to be constantly cleared of sediment deposited by frequent high-water events in order to provide parking and launching areas.
2. The intersection with County Road 24 needs to be redesigned to eliminate the steep incline and poor visibility.
3. River Road is too narrow for two-way traffic through most of its length. An alternate route needs to be developed that would allow anglers and other river users to reach the Cahaba River within the refuge with less difficulty.

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Maintenance costs:

Signs - \$250  
Trash Removal - \$250  
Grading - \$5000  
Gravel - \$7,500

Monitoring costs:

The refuge may utilize automatic traffic counters to track the number of vehicles for all uses combined. Costs for this effort attributable to fishing are estimated at \$750 initially and \$250 annually after the first year.

Offsetting revenues: None

Cahaba River NWR currently is unstaffed and complexed with Wheeler NWR. The refuge manager for this refuge is stationed at Mountain Longleaf NWR in Anniston, Alabama, and is the only staff person. The refuge has no law enforcement or administrative staff on-site and relies on Wheeler NWR's law enforcement and administrative staffs to meet these obligations. Cahaba River NWR currently has no maintenance staff but uses outside contracts and Wheeler NWR maintenance staff to meet increased maintenance needs. Funding for specific needs and projects are currently being sought through the Refuge Operations and Needs System (RONS) program.

**Anticipated Impacts of the Use:**

Short-term impacts:

Anticipated impacts from this use are all minor and include damage to vegetation, littering, increased refuge maintenance response to activities, potential conflicts with other visitors, and disturbance to wildlife.

Long-term impacts:

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

Cumulative:

No cumulative impacts are anticipated.

**Public Review and Comment:** These draft compatibility determinations are available for review and comment during the public review period established for Cahaba River NWR's Draft CCP/EA. All comments will be addressed in the Final CCP.

**Determination (check one below):**

Use is Not Compatible

Use is Compatible with Following Stipulations

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**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. Activity may occur during refuge hours only. Overnight camping and ATVs would not be allowed.

**Justification:**

Allowing fishing on the refuge would be consistent with established refuge goals.

Fishing is one of the six wildlife-dependent public uses that are to be supported within units of the National Wildlife Refuge System when compatible.

This use is not expected to conflict with any proposed habitat management or reclamation projects on the refuge, provided the refuge utilizes closures as necessary to protect public safety and to allow habitat management actions such as prescribed burning on the refuge.

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

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

**Mandatory 15-year Re-evaluation Date:****Description of Use:** Big Game and Upland Game Hunting

Cahaba River NWR was established on September 25, 2002. Hunting occurred on this private property prior to refuge establishment via hunting leases and other private agreements. Hunting offers the public a recreation opportunity identified as a priority wildlife-dependent public use of the National Wildlife Refuge System.

Hunting is one of the six legislated wildlife-dependent, priority public uses of the National Wildlife Refuge System. Hunting is subject to federal, state and refuge-specific regulations and occurs within designated hunting areas on the refuge. Hunting occurs throughout the refuge area acquired to date; and as additional areas are acquired, they will be evaluated to determine suitability for this activity. Hunting occurs during refuge hunting seasons that are within the Alabama Department of Conservation and Natural Resources' established hunting seasons. Meetings are held annually with Alabama Department of Conservation and Natural Resources staff to set these dates. Camping and use of ATVs would not be allowed. Tree stands or blinds are to be removed daily by the hunter.

Currently, all deer hunting on the refuge is limited archery only to limit the number of hunters utilizing the area and create quality archery hunting opportunities. Interest has been expressed in allowing gun hunting on the refuge for big game; however, refuge staff feel the refuge provides an oasis for archery hunters and opening the area to allow gun hunting would increase not only the number of hunters utilizing the area, but also the associated maintenance and law enforcement required to properly manage the hunt.

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Access to many areas is limited and most areas of the refuge are accessed via gated roads. Due to ongoing problems with dumping, littering, and graffiti in the area, it is unlikely that these gated roads would be opened for the public to access the refuge in the near future. The current lack of access necessitates hiking or boating to many hunting areas on the refuge. Additional access would be provided to more refuge areas as they become available through acquisition.

Based on hunting information from the adjacent Cahaba River Wildlife Management Area, we estimate up to 50 people and 20 vehicles utilize the public hunting area each day of the weekend during the peak of seasons for white-tailed deer and wild turkey. We approximate 15 people and 5 vehicles on a weekday during the peak of the white-tailed deer and wild turkey season. We estimate up to 50 additional user-days per year for all other species hunted.

**Availability of Resources:**

Approximately \$9,000 of staff time and \$20,000 of other operations and maintenance funding would be needed to administer this use.

Cahaba River NWR currently is unstaffed and complexed with Wheeler NWR. The refuge manager for this refuge is stationed at Mountain Longleaf NWR in Anniston, Alabama, and is the only staff person. The refuge has no law enforcement or administrative staff on-site and relies on Wheeler NWR's law enforcement and administrative staffs to meet these obligations. Cahaba River NWR currently has no maintenance staff but uses volunteers, outside contracts, and Wheeler NWR maintenance staff to meet increased maintenance needs.

Maintenance costs:

Staff Time

- Hunt Coordination Meetings and Data Analysis - \$2,000
- Monitoring of Hunting Activities - \$3,000
- Trash Pick-up - \$500
- Staff Time for Maintenance Activities Described Below - \$3,500

Maintenance

- Road Repair/Grading - \$5,000
- Gravel - \$10,000
- Signs - \$1,000
- Trash Removal - \$1,000
- Mowing - \$3,000

Monitoring costs: None

Offsetting revenues: None

The refuge is currently unstaffed and unfunded.

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**Anticipated Impacts of the Use:**

Short-term impacts:

Anticipated impacts from this use are all minor and include damage to vegetation, littering, increased refuge maintenance response to activities, potential conflicts with other visitors, and disturbance to wildlife.

Long-term impacts:

No long-term impacts to wildlife or habitats are anticipated with use as proposed. Impacts to wildlife populations would be avoided provided deer hunting is limited to archery only to control the numbers of hunters.

Cumulative:

No cumulative impacts are anticipated.

**Public Review and Comment:** These draft compatibility determinations are available for review and comment during the public review period established for Cahaba River NWR's Draft CCP/EA. All comments will be addressed in the Final CCP.

**Determination (check one below): Big Game Hunting**

Use is Not Compatible

Use is Compatible with Following Stipulations

**Determination (check one below): Upland Game Hunting**

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. Activity may occur during refuge hours only. Overnight camping and ATVs would not be allowed.

Deer hunting would be limited to archery-only to limit the number of hunters utilizing the area and provide quality hunt opportunities. Hunting would be limited to those species authorized to be hunted on the refuge as listed in the Federal Register.

**Justification:**

Allowing hunting on the refuge would be consistent with established refuge goals.

Hunting is one of the six wildlife-dependent public uses that are to be supported within units of the National Wildlife Refuge System when compatible.

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This use is not expected to conflict with any proposed habitat management or reclamation projects on the refuge, provided the refuge utilizes closures as necessary to protect public safety and to allow habitat management actions such as prescribed burning on the refuge.

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

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

**Mandatory 15-year Re-evaluation Date:**

**Description of Use:** Wildlife Observation and Wildlife Photography

Cahaba River NWR was established on September 25, 2002. Wildlife observation and wildlife photography offer the public recreation opportunities identified as priority wildlife-dependent public uses of the National Wildlife Refuge System. Wildlife observation and wildlife photography occur year-round during posted refuge hours, are subject to any applicable federal and refuge-specific regulations and occur within designated public use areas on the refuge.

Wildlife observation and wildlife photography are two of the six legislated wildlife-dependent, priority public uses of the National Wildlife Refuge System. The level of interest in the local community has been significant since refuge establishment with the number of users approximated at 23,000 annually.

Wildlife observation and wildlife photography occurs throughout the refuge area acquired to date. As additional areas are acquired they would be evaluated to determine suitability for this activity.

Access to many areas is limited to due to ongoing acquisition. All other areas of the refuge are accessed via gated private roads. Due to ongoing problems with dumping, littering, and graffiti in the area, it is unlikely that these gated private roads would be opened for the public to access the refuge in the near future. As we complete refuge acquisition, additional access may be provided.

**Availability of Resources:**

Approximately \$7,000 of staff time and \$8,000 of other operations and maintenance funding would be needed to administer this use.

Cahaba River NWR currently is unstaffed and complexed with Wheeler NWR. The refuge manager for this refuge is stationed at Mountain Longleaf NWR and is the only staff person. The refuge has no law enforcement or administrative staff on-site and relies on Wheeler NWR's law enforcement and administrative staffs to meet these obligations. Cahaba River NWR currently has no maintenance staff, but uses outside contracts and Wheeler NWR maintenance staff to meet increased maintenance needs.

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Maintenance costs:

Staff Time

Monitoring of Activities - \$3,000

Trash Removal - \$500

Staff Time for Maintenance Activities Described Below - \$3,500

Maintenance

Road Repair/Grading - \$2,000

Gravel - \$5,000

Signs - \$1,000

Monitoring costs:

The refuge may utilize automatic traffic counters to track the number of vehicles for all uses combined. Costs for this effort attributable to wildlife observation and wildlife photography are estimated at \$750 initially and \$250 annually after the first year.

Offsetting revenues: - None

Cahaba River NWR currently is unstaffed and complexed with Wheeler NWR. The refuge manager for this refuge is stationed at Mountain Longleaf NWR in Anniston, Alabama, and is the only staff person. The refuge has no law enforcement or administrative staff on-site and relies on Wheeler NWR's law enforcement and administrative staffs to meet these obligations. Cahaba River NWR currently has no maintenance staff, but uses outside contracts and Wheeler NWR maintenance staff to meet increased maintenance needs. Funding for specific needs and projects are currently being sought through the Refuge Operations and Needs System (RONS) program.

**Anticipated Impacts of the Use:**

Short-term impacts:

Anticipated impacts from this use are all minor and include damage to vegetation, littering, increased refuge maintenance response to activities, potential conflicts with other visitors, and disturbance to wildlife.

Long-term impacts:

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

Cumulative:

No cumulative impacts are anticipated.

**Public Review and Comment:** These draft compatibility determinations are available for review and comment during the public review period established for Cahaba River NWR's Draft CCP/EA. All comments will be addressed in the Final CCP.

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**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. Activity may occur during refuge hours only.

**Justification:**

Allowing wildlife observation and wildlife photography on the refuge is consistent with established refuge goals.

Wildlife observation and wildlife photography are two of the six wildlife-dependent public uses that are to be supported within units of the National Wildlife Refuge System when compatible.

These uses are not expected to conflict with any proposed habitat management or reclamation projects on the refuge, provided the refuge utilizes closures as necessary to protect public safety and to allow habitat management actions such as prescribed burning on the refuge.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

**Mandatory 15-year Re-evaluation Date:**

**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. Limited environmental education and interpretation opportunities have been developed since establishment of the refuge on September 25, 2002. Local interest in these activities is growing and initial estimates are 1,500 users annually. These priority public uses would be expanded as resources and demand permit.

Environmental education and interpretation offer the public educational opportunities identified as priority wildlife-dependent public uses of the National Wildlife Refuge System. Environmental education and interpretation occur year-round during posted refuge hours. Environmental education and interpretation are subject to any applicable federal, state, and refuge-specific regulations and occur within designated public use areas on the refuge.



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Environmental education and interpretation occur throughout the refuge area acquired to date, and as additional areas are acquired they would be evaluated to determine suitability for this activity.

Access to many areas is limited due to ongoing acquisition. All other areas of the refuge are accessed via gated private roads. Due to ongoing problems with dumping, littering, and graffiti in the area, it is unlikely that these gated private roads would be opened for the public to access the refuge in the near future. As we complete refuge acquisition, additional access may be provided.

**Availability of Resources:**

Approximately \$6,000 of staff time and \$9,000 of overhead would be needed to administer this use.

Cahaba River NWR currently is unstaffed and complexed with Wheeler NWR. The refuge manager for this refuge is stationed at Mountain Longleaf NWR in Anniston, Alabama, and is the only staff person. The refuge has no law enforcement or administrative staff on-site and relies on Wheeler NWR's law enforcement and administrative staffs to meet these obligations. Cahaba River NWR currently has no maintenance staff but uses outside contracts and Wheeler NWR maintenance staff to meet increased maintenance needs. Interpretive signs must be developed and installed to support these uses.

Maintenance costs:

Staff Time

Monitoring or Guiding of Activities - \$3,000

Trash Removal - \$500

Staff Time for Maintenance Activities Described Below - \$2,500

Maintenance

Road/Trail Repair/Grading - \$2,000

Gravel - \$4,000

Signs - \$3,000

Monitoring costs:

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

The refuge is currently unstaffed and unfunded. Funding for specific needs and projects are currently being sought through the Refuge Operations and Needs System (RONS). The refuge partners with the Alabama Cooperative Extension Service in Bibb County.

**Anticipated Impacts of the Use:**

Short-term impacts:

Anticipated impacts from this use are all minor and include damage to vegetation, littering, increased refuge maintenance response to activities, potential conflicts with other visitors, and disturbance to wildlife.

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Long-term impacts:

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

Cumulative:

No cumulative impacts are anticipated.

**Public Review and Comment:** These draft compatibility determinations are available for review and comment during the public review period established for Cahaba River NWR's Draft CCP/EA. All comments will be addressed in the Final CCP.

**Determination (check one below): Environmental education (teaching students)**

Use is Not Compatible

Use is Compatible with Following Stipulations

**Determination (check one below): Environmental education (other)**

Use is Not Compatible

Use is Compatible with Following Stipulations

**Determination (check one below): Environmental education (teaching teachers or group leaders)**

Use is Not Compatible

Use is Compatible with Following Stipulations

**Determination (check one below): Interpretation**

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. These uses may occur during refuge hours only.

**Justification:**

Allowing environmental education and interpretation on the refuge is consistent with established refuge goals.

Environmental education and interpretation are two of the six wildlife-dependent public uses supported within units of the National Wildlife Refuge System when compatible.

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These uses are not expected to conflict with any proposed habitat management or reclamation projects on the refuge, provided the refuge utilizes closures as necessary to protect public safety and to allow habitat management actions such as prescribed burning on the refuge.

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

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

**Mandatory 15-year Re-evaluation Date:**

**Description of Use:** Bicycling

Riding bicycles for transportation, pleasure or exercise, is not one of the six priority public uses of the National Wildlife Refuge System; however, bicycling supports these priority public uses. Bicycling is an environmentally sound transportation method that allows users to visit the refuge without noise or air pollution associated with motor vehicles.

Bicycling is currently allowed only for transportation only on roads open for vehicle traffic. Bicycling occurs year-round during refuge hours; although, it is more likely to occur from April to October due to weather conditions. Bicycle riding is self-guided, utilizing refuge maps, brochures, and kiosks.

Access to many areas is limited due to ongoing acquisition. All other areas of the refuge are accessed via gated private roads. Due to ongoing problems with dumping, littering, and graffiti in the area, it is unlikely that these gated private roads would be opened for the public to access the refuge in the near future. As we complete refuge acquisition, additional access may be provided.

**Availability of Resources:**

Approximately \$1,500 of staff time and \$5,000 of operations and maintenance funding are needed to administer this use, provided bicycling is confined to roads that allow vehicular traffic.

Cahaba River NWR currently is unstaffed and complexed with Wheeler NWR. The refuge manager for this refuge is stationed at Mountain Longleaf NWR in Anniston, Alabama, and is the only staff person. The refuge has no law enforcement or administrative staff on-site and relies on Wheeler NWR's law enforcement and administrative staffs to meet these obligations. Cahaba River NWR currently has no maintenance staff, but uses outside contracts and Wheeler NWR maintenance staff to meet increased maintenance needs.

Traffic on refuge roads is limited to refuge users only, a bicycle or pedestrian lane would not be required.

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Maintenance costs:

Monitoring or Guiding of Activities - \$500  
Trash Pick-up - \$250

Staff time for Maintenance Activities Described Below - \$750

Road/Trail Repair/Grading - \$1,000  
Gravel - \$3,000  
Signs - \$500  
Bicycle Racks - \$500

Monitoring costs:

The refuge may utilize automatic traffic counters to track the number of vehicles for all uses combined. Costs for this effort attributable to bicycling is estimated at \$200 initially and \$100 annually after the first year.

Offsetting revenues: None

**Anticipated Impacts of the Use:**

Short-term impacts:

Anticipated impacts from this use are all minor and include damage to vegetation, littering, increased refuge maintenance response to activities, potential conflicts with other visitors, and disturbance to wildlife.

Long-term impacts:

No long-term impacts are expected on wildlife or habitat.

Cumulative:

No cumulative impacts are anticipated with this use as proposed.

**Public Review and Comment:** These draft compatibility determinations are available for review and comment during the public review period established for Cahaba River NWR's Draft CCP/EA. All comments will be addressed in the Final CCP.

**Determination (check one below): Bicycling**

Use is Not Compatible

Use is Compatible with Following Stipulations

**Stipulations Necessary to Ensure Compatibility:**

Bicycling is confined to roads open to vehicular traffic. Bicycles and bicycling would be prohibited on all firebreaks, trails, and roads not open for vehicular traffic.

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

**Justification:**

Bicycling enables refuge users to travel to refuge trailheads and kiosks, whereby, supporting legislated wildlife-dependent public uses.

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

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

**Mandatory 10- year Re-evaluation Date:**

**Description of Use:** Canoeing

Canoeing is a popular recreational activity that allows users to visit and see the refuge, and the level of interest in the central Alabama area is significant. Canoeing for pleasure is not one of the six legislated uses of the National Wildlife Refuge System; however, it does support them in an environmentally sound method that allows users to visit the refuge without noise or air pollution.

The Cahaba River is currently being utilized for recreational canoeing, and the refuge serves as one of the few public launch sites in Bibb County. The number of users is approximated at 5,000 annually, with this number expected to increase with the launch of the Cahaba River Blueway, a comprehensive canoe trail running through central Alabama.

The refuge represents the only public launching area within a 30-mile stretch of the river; but currently, only one refuge road is available to access the Cahaba River. Access to many areas is limited due to ongoing acquisition; however, as we complete refuge acquisition, additional access may be provided.

Canoeing can occur year-round; although, it mostly occurs April to October due to weather conditions. Canoeing is self-guided, utilizing refuge maps, brochures, and kiosks. The Cahaba River Blueway would expand on this guidance by providing a cohesive approach to all signage and brochures associated with recreational use of the Cahaba River.

**Availability of Resources:**

Approximately \$3,000 of staff time and \$7,000 of other operations and maintenance funding would be needed to administer this use.

Cahaba River NWR currently is unstaffed and complexed with Wheeler NWR. The refuge manager for this refuge is stationed at Mountain Longleaf NWR in Anniston, Alabama, and is the only staff person. The refuge has no law enforcement or administrative staff on-site and relies on Wheeler

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NWR's law enforcement and administrative staffs to meet these obligations. Cahaba River NWR currently has no maintenance staff, but uses outside contracts and Wheeler NWR maintenance staff to meet increased maintenance needs.

The River Road leading to the Cahaba River on the refuge needs several improvements

1. The launch and fishing area at the Cahaba River needs to be constantly cleared of sediment deposited by frequent high-water events in order to provide parking and launching areas.
2. The intersection with County Road 24 needs to be redesigned to eliminate the steep incline and poor visibility.
3. River Road is too narrow for two-way traffic through most of its length. An alternate route needs to be developed that would allow canoeists, kayakers, and other river users to reach the Cahaba River within the refuge with less difficulty.

Maintenance costs:

Staff Time

Monitoring or Guiding of Activities - \$500

Trash Removal - \$500

Staff Time for Maintenance Activities Described Below - \$2,000

Road/Trail Repair/Grading - \$1,000

Gravel - \$4,000

Signs - \$1,500

Mowing - \$500

Monitoring costs:

The refuge may utilize automatic traffic counters to track the number of vehicles for all uses combined. Costs for this effort attributable to canoeing is estimated at \$500 initially and \$200 annually after the first year.

Offsetting revenues: None

**Anticipated Impacts of the Use:**

Short-term impacts:

Anticipated impacts from this use are all minor and include damage to vegetation, littering, increased refuge maintenance response to activities, potential conflicts with other visitors, and disturbance to wildlife.

Long-term impacts:

No long-term impacts are expected on wildlife or habitat.

Cumulative:

No cumulative impacts are anticipated with this use as proposed.

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**Public Review and Comment:** These draft compatibility determinations are available for review and comment during the public review period established for Cahaba River NWR's Draft CCP/EA. All comments will be addressed in the Final CCP.

**Determination (check one below): Canoeing**

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. Activity may occur during refuge hours only. Overnight camping would not be allowed.

**Justification:**

As proposed, canoeing would support legislated wildlife-dependent public uses.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

**Mandatory 10- year Re-evaluation Date:**

**Use:** Research Studies and Scientific Collection

**Supporting Uses:**

Collection of animals, plants, soil, or water for scientific purposes

**Supporting Facilities:**

Public access area, boat ramp, vehicle parking area

**Description of Use:**

Resource research and scientific studies conducted by local, state, or federal agencies; local schools, technical colleges, and universities; non-profit organizations; and private, for profit research companies conducted on the refuge when the refuge acts solely in an administrative role. The assistance provide by the refuge may range from minimal to substantial depending on the benefits to the Service. This includes data gathering for hypothesis testing, modeling, monitoring, and surveying. This use also includes permitting the collection of animals, fish, plants, soils, and water for

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monitoring and research purposes. The research and collection activities would vary in scope and duration to satisfy the requirements of the research project or survey. Projects may involve everything from a limited one time sampling or survey to long-term study plots.

Scientific research studies would be accommodated for the purpose of properly administering the refuge, advancing the mission of the National Wildlife Refuge System, and protecting the health, biological integrity, diversity of the Cahaba River ecosystem, and the health and safety of the public. The objective of authorizing this use is to gain better knowledge of our natural resources and improved methods to manage, monitor, and protect refuge resources and the public.

All animals and fish captured, handled, released, collected, and curated would follow the best scientific practices and standards established by respected scientific societies, as well as the Service's policies and guidelines for scientific collecting and research.

All research studies would be evaluated and if deemed beneficial, a special use permit would be issued as an agreement between the researcher and the refuge. The permit would outline the guidelines that the researcher must follow while conducting research on the refuge.

#### **Availability of Resources:**

Cahaba River NWR is administered by the Mountain Longleaf NWR. Approximately \$5,000 of staff time and \$3,000 of other operations and maintenance funding would be needed to administer this use.

Cahaba River NWR is unstaffed and would continue to be administered by the Mountain Longleaf NWR. The refuge has the staff and funding to administer permits for scientific collecting, studies, and research that require ten or less staff days to administer the project. Requests that require more than ten staff days to administer would only be authorized if the refuge has adequate funding to administer the requested project.

#### **Anticipated Impacts of the Use:**

##### *Short-term impacts:*

There should be no significant adverse impacts from scientific research because each proposal would be reviewed when issued, and annually for multi-year projects, for appropriateness and consistency with the Service's policies for conducting research and this compatibility determination before the researcher would be issued a special use permit. Factors such as project purpose, data collection methods, number of researchers, transportation, project duration, and location of access points would determine the extent of effects on the refuge. The knowledge gained from the research activities would provide information towards improving management techniques for trust resource species. Impacts such as trampling vegetation, removal of small numbers of plants and/or animals, and temporary disturbance to wildlife could occur, but should not be significant.

##### *Long-term impacts:*

Long-term benefits associated with species' population trends and improved management techniques would outweigh any negative impacts which may occur.



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**Public Review and Comment:** These draft compatibility determinations are available for review and comment during the public review period established for Cahaba River NWR's Draft CCP/EA. All comments will be addressed in the Final CCP.

**Determination (check one below): Camping**

Use is Not Compatible

Use is Compatible with Following Stipulations

**Stipulations Necessary to Ensure Compatibility:**

Each request for use of the refuge for research would be examined on its individual merits. Questions of who, what, when, where, and why would be asked to determine if the requested proposal would contribute to the refuge purposes and could be best conducted on the refuge without significantly affecting the resources. If so, the researcher would be issued a special use permit that would clearly define allowable activities. Progress would be monitored through annual reports. The success and usefulness of the data would be evaluated through final reports, and chronicles in publications derived from the research.

The following stipulations apply to special use permits issued for scientific research. Monitoring authorized research activities would ensure compliance with the permit's general and special conditions.

- The permittee is responsible for ensuring that all employees, party members, and any other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of the permit.
- The permit may be cancelled or revised at any time by the refuge manager in case of emergency, unsatisfactory compliance, or determination of incompatibility with the purpose of the refuge.
- In accordance with the Archaeological Resources Protection Act (16 USC 470aa), the removal or disturbance of archaeological or historical artifacts is prohibited. The excavation, disturbance, collection, or purchase of historical, ethnological, or archaeological specimens or artifacts is prohibited.
- All waste materials and markers must be removed from the refuge upon the permittee's departure.
- Construction of structures is prohibited unless prior approval is obtained.

**Justification:**

The benefits derived from sound research provide a better understanding of resources on the refuge and surrounding area. This knowledge becomes valuable in managing natural systems, establishing thresholds, identifying threats, and better understanding the species and the environmental communities present on the refuge. Research projects would be designed to minimize impacts and disturbance.

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

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

**Mandatory 10- year Re-evaluation Date:**

**Use:** Commercial Forest Management Operations

**Description of Use:** Commercial forest management operations are used to conduct timber thinning, regeneration of timber stands, treatment of pine beetle outbreaks, and other silvicultural practices used to improve forest habitat conditions. These operations are not priority public uses of the Refuge System under the Improvement Act of 1997, but instead are management activities.

Commercial forest management operations, including when necessary, the use of commercial silvicultural contractors and techniques, including the use of pesticides to control exotic and nuisance plant species, will contribute to the purposes for which the Cahaba River NWR was established, the mission of the Refuge System, the enhancement of biological integrity, diversity, and environmental health and to facilitate the ability of the refuge to meet its habitat and wildlife management objectives.

The refuge has primarily forested habitat, being approximately 3,540 acres of forest on about 3,681 acres of land owned by the Service. The Comprehensive Conservation Plan details the concepts and specifics of desired future conditions of the forest to provide enhanced habitat for federally listed species and priority trust species.

To achieve goals over the next 15 years, manipulation through commercial forestry is essential. The refuge does not have the required staffing, equipment, and expertise to harvest timber on a large scale. Commercial forestry operations will be allowed to cut and remove timber from the refuge and sell the removed wood to commercial buyers (mills) and operators (loggers) that will pay market value for portions of the trees removed. All commercial activities occurring on the refuge require the business to obtain a special use permit. Work conducted under the authority of this permit will be closely monitored by the refuge manager or his designee. Revenue generated by the sale of refuge wood products will contribute to the Refuge Revenue Sharing fund that provides payments to the counties in lieu of property taxes.

**Availability of Resources:** The components needed to manage the process must come from Regional staff, including salary and positions (Regional forester and Deputy Regional Forester.) The refuge manager provides administrative oversight of the program and the administrative officer tracks and monitors the financial payments. The refuge manager is responsible for assessing impact to wildlife. Some amount of time may be required by other positions including maintenance workers from Wheeler NWR.

**Anticipated Impacts of the Use:** The operation of heavy equipment for forest management over refuge roads and through natural habitats has the potential to impact soils, cause severe rutting, result in increased site erosion, or degrade nearby wetlands or water resources. Therefore, all commercial forest management actions will be mitigated by following forestry management procedures described in Alabama's Best Management Practices for Forestry (2007).

Heavy equipment use required for timber harvesting operations also has the potential to result in localized impacts to vegetation and wildlife. Damage or destruction of understory vegetation, including

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rare plants and unique botanical communities, is of concern. These impacts can be prevented through careful management of stream-side management zones and use of exclusion zones.

Whole tree harvesting can result in a reduction of downed wood and snags in a forest ecosystem. Skidding operations can cause residual damage to trees remaining in the stand that can result in the introduction of disease and insects into an otherwise healthy forest. Harvesting trees may also leave the remaining trees more susceptible to wind throw, altering plant and animal communities, facilitating the spread of invasive plants, disturbing wildlife temporarily, or displacing it over the long term. Forest prescriptions are designed to minimize these impacts.

**Public Review and Comment:** These draft compatibility determinations are available for review and comment during the public review period established for Cahaba River NWR's Draft CCP/EA. All comments will be addressed in the Final CCP.

**Determination (check one below):**

Use is Not Compatible

Use is Compatible with the Following Stipulations

**Stipulations Necessary to Ensure Compatibility:** Close inspection and supervision of all timber operations are necessary to ensure that harvesting operations meet the special conditions of the special use permit and produce the outcome needed to meet refuge goals and objectives. The Service's Regional or Deputy Regional forester will inspect the treatment site and assess effectiveness of the treatment.

The following special conditions are included in the bid invitation and permits for all commercial forestry activities to further protect the resources of the refuge. These conditions may be modified at any time to provide better guidance to operators and protection of refuge resources.

1. A pre-entry conference with permittee and his loggers will be held prior to any work being done on the sale area or haul roads associated with the sale area. A pre-entry meeting will be held before initiation of activity within each compartment and stand prior to start of any work. The refuge manager or his representative retains authority to stop logging operations at any time if road, weather, water, or other unsatisfactory conditions exist.
2. The permittee will maintain any refuge road, right-of-way, or easements. The permittee will repair any damages to the haul roads, primary gravel roads or paved roads resulting from logging operations to standards existing prior to timber harvest activities. Repair and maintenance work may include, but is not limited to, grading, graveling, or rocking. Cost to repairs or replacements of damaged culverts or other infrastructure caused by logging equipment will be the sole responsibility of the permittee. When applicable, reasonable actual costs for work on refuge graveled roads will be refunded from performance deposits. The expense of work on dirt roads within the sale area is the sole responsibility of the permittee. No new roads will be created and all access will be limited to existing roads and infrastructure.
3. The location of loading decks and logging roads will be mutually agreed to by permittee (or his representative) and refuge manager or his designee prior to their placement. All primary haul roads used by permittee will be left in good condition or blocked after operations are completed by placing logging slash and/or dirt mounds across all entrance points as

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directed by refuge manager or his designee. Those roads to be left open will be built up enough so that the road will not hold standing water any more than the adjacent area. This will require the use of equipment such as a bulldozer and/or road grader. If required as determined by the refuge manager or his designee, blocked roads will be re-seeded with refuge approved grasses to prevent erosion.

4. In forestry operations, no trees planned to be left (leave trees) following the operation will be cut or excessively damaged. Excessive is defined more specifically as: (1) bole damage that exposes cambium more than 6 inches (in any dimension); and (2) crown damage of 1/3 or more of the crown. As determined by the refuge manager or his designee, penalties may be assessed for cutting or damaging leave trees at a rate of three (3) times the stumpage paid for the harvested merchantable timber.
5. Trees shall be cut so as to leave a stump not less than 4 inches high and no more than 12 inches high on the side adjacent to the highest ground. Ground level paint spot must be visible after the tree has been cut.
6. Skid trails with turn trees should be planned to prevent the damage to leave trees. Turn trees shall consist of trees being harvested and should be removed only after use of skid trails ends.
7. All logging operations shall be conducted during daylight hours.
8. Trees and tops cut shall not be left hanging or supported by any other living or dead tree or brush and shall be pulled down immediately after falling.
9. Tops and logging debris shall be kept pulled back 50 feet from highways, county roads, refuge roads, and trees with basal cavities. All openings and fields must be kept clear of tops and debris. The permittee and his employees will do all within their power to prevent and suppress fires; shall pay the Federal Government for any unnecessary damage to roads, fields, openings, and ditches resulting from operations.
10. Logging operations will be allowed only when site conditions allow. Logging will not be allowed when ground is wet and subject to rutting or severe soil compaction. At no time will rutting deeper than 6" be allowed.
11. The refuge manager or his designee shall have the authority to temporarily close down all or any part of the operation during a period of high fire danger, inclement weather, refuge hunts, safety reasons, or any other reason deemed necessary. Extensions to the special use permit time period equal to the closed period will be granted to the permittee. Extensions will not be granted due to inactivity during favorable harvesting conditions.
12. Logging operations will not be allowed in a stand containing bats cluster sites during the breeding season, usually March 1 to October 31.
13. The permittee (or his representative) will not litter. Disposal of petroleum products onsite is prohibited. Equipment must be maintained and not leak more than a few drops of petroleum product per day. Performance bond monies may be used to pay for litter clean-up.
14. Tree-length logging and skidders will be allowed. Unnecessary damage to the residual stand will not be tolerated. As determined by the refuge manager or his designee, penalties

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may be assessed for damage to unmarked trees at a rate of three (3) times the stumpage paid for the harvested merchantable timber.

15. If spacing between trees does not allow cutter head grapples to be used without damage to leave trees, alternative harvest methods should be used.
16. Sufficient cut trees, trees that are to be removed as part of the operation, should be left along the skid trails and deck to prevent skidder damage to leave trees and these cut trees should be the last trees removed as part of the operation.
17. Each portion of the sale area must be completed before moving to other portions of the area unless authorized by the refuge manager.
18. The permittee will be responsible for job safety while operating on the refuge.
19. The possession and/or use of firearms and alcohol on the refuge are prohibited.
20. All of the best management practices for forestry in Alabama will be followed as mandatory practices. Failure to follow these practices is grounds for termination of the special use permit.

**Justification:** Commercial forest management, to include such actions as commercial timber thinning, salvage, and other silvicultural practices, is used to improve forest habitat conditions. Commercial forest management allows the refuge to maintain and enhance necessary habitat for wildlife, including threatened and endangered species by promoting plant communities beneficial to these species. Additionally, use of commercial foresters can protect forest health during time requiring emergency forest actions to prevent unwanted spread of insect or disease outbreaks.

The primary goal of active forest management on the refuge will be to enhance and maintain habitat for species identified as resources of concern and associated habitat communities identified in the comprehensive conservation plan. Commercial forest management operations, including when necessary the use of commercial silvicultural contractors and techniques, will contribute to the purposes for which the refuge was established, the mission of the Refuge System, and the enhancement of biological integrity, diversity, and environmental health. These management operations will also facilitate the ability of the refuge to meet its habitat and wildlife objectives.

Commercial forest management operations will not materially interfere with, or detract from, the mission of the Refuge System or the purpose for which the refuge was established.

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

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

**Mandatory 10-year Re-evaluation Date:**

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### Approval of Compatibility Determinations

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

**Refuge Manager:** \_\_\_\_\_  
(Signature/Date)

**Regional Compatibility  
Coordinator:** \_\_\_\_\_  
(Signature/Date)

**Refuge Supervisor:** \_\_\_\_\_  
(Signature/Date)

**Chief, National  
Wildlife Refuge System,  
Southeast Region:** \_\_\_\_\_  
(Signature/Date)



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# Appendix G. Intra-Service Section 7 Biological Evaluation

## SOUTHEAST REGION

### INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

[Federally endangered, threatened, and candidate species]

[Note: This form provides the outline of information needed for intra-Service consultation. If additional space is needed, attach additional sheets, or set up this form to accommodate your responses.]

**Originating Person:** Sarah Clardy  
**Telephone Number:** (256) 848-6833  
**Date:** \_\_\_\_\_

**E-Mail:** sarah\_clardy@fws.gov

**PROJECT NAME (Grant Title/Number):** Cahaba River Comprehensive Conservation Plan and Environmental Assessment

**I. Service Program:**

- Ecological Services
- Federal Aid
  - Clean Vessel Act
  - Coastal Wetlands
  - Endangered Species Section 6
  - Partners for Fish and Wildlife
  - Sport Fish Restoration
  - Wildlife Restoration
- Fisheries
- Refuges/Wildlife

**II. State/Agency:** Alabama

**III. Station Name:** Cahaba River National Wildlife Refuge

**IV. Description of Proposed Action (attach additional pages as needed):**

The proposed action consists of approving and then implementing a Comprehensive Conservation Plan (CCP) for Cahaba National Wildlife Refuge in Bibb County, Alabama, as required under the National Wildlife Refuge System Improvement Act of 1997. The CCP provides overall management guidance on the refuge over a 15-year period in the form of a vision, goals, objectives, and strategies related to fish and wildlife management, habitat management, resources protection, visitor use, and refuge administration.

The purpose of a CCP is to describe the desired future conditions of a refuge and provide long-range guidance and management direction to accomplish the purposes of the refuge, to contribute to the mission of the Refuge System, and to meet other relevant mandates. The CCP details the proposed action to improve refuge management in the following area: wildlife and habitat management, resource protection, visitor services, and refuge administration. The proposed action (Alternative B) focuses on expanding habitat and wildlife management.



V. **Pertinent Species and Habitat:**

A. **Include species/habitat occurrence map:** Biological systems on the refuge have been surveyed by the Service, The Nature Conservancy (TNC), various colleges and universities and others. Service biologists are working closely with TNC in identifying all rare species and important upland community types. Species listed in Table V.B. are known from Bibb County. Species known to occur on the refuge are shown in Appendix I of the Draft CCP/EA.

B. Complete the following table:

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

SPECIES/CRITICAL HABITAT	STATUS <sup>1</sup>	NOTES <sup>2</sup>
round rocksnail ( <i>Leptoxis ampla</i> )	T	
flat pebblesnail ( <i>Lepyrium showalteri</i> )	E	
cylindrical lioplax ( <i>Lioplax cyclostomaformis</i> )	E	
fine-lined pocketbook ( <i>Lampsilis altilis</i> )	T	CH
orange-nacre mucket ( <i>Lampsilis perovalis</i> )	T	CH
ovate clubshell ( <i>Pleurobema pervatum</i> )	E	CH, X
southern clubshell ( <i>Pleurobema decisum</i> )	E	CH, X
triangular kidneyshell ( <i>Ptychobranhus greenii</i> )	E	CH
southern acornshell ( <i>Epioblasma othcaloogensis</i> )	E	CH, X
upland combshell ( <i>Epioblasma metastrata</i> )	E	CH, X
Alabama moccasinshell ( <i>Medionidus parvulus</i> )	T	CH, X
Cahaba shiner ( <i>Notropis cahabae</i> )	E	
goldline darter ( <i>Percina aurolineata</i> )	T	
blue shiner ( <i>Cyprinella caerulea</i> )	T	X
Mitchell's satyr butterfly ( <i>Neonympha mitchellii mitchellii</i> )	E	
Mohr's Barbara's button ( <i>Marshallia mohrii</i> )	T	
Tennessee yellow-eyed grass ( <i>Xyris tennesseensis</i> )	E	

SPECIES/CRITICAL HABITAT	STATUS <sup>1</sup>	NOTES <sup>2</sup>
Georgia rockcress ( <i>Arabis georgiana</i> )	C	
Gentian Pinkroot ( <i>Spigelia gentianoides</i> var. <i>alabamensis</i> )	E	
wood stork ( <i>Mycteria americana</i> )	T	
red-cockaded woodpecker ( <i>Picoides borealis</i> )	E	
gray bat ( <i>Myotis grisecens</i> )	E	
Indiana bat ( <i>Myotis sodalis</i> )	E	
bald eagle ( <i>Haliaeetus leucocephalus</i> )	BGEPA	

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

**VI. Location (attach map):**

- A. Ecoregion Number and Name:** Central Gulf Watershed (29)
- B. County and State:** Bibb County, Alabama
- C. Section, township, and range (or latitude and longitude):** Section 21, 27 and 28 T22S, R5W; 2, 3,9, 10, 11, 15, 16 and 17 T24N, R10E
- D. Distance (miles) and direction to nearest town:** West Blocton is approximately 6 miles west of the project area.
- E. Species/habitat occurrence:** Fourteen mussels, snails, and fish are known to occur or have previously occurred within the Cahaba and/or Little Cahaba rivers within the refuge boundary. Five of these aquatic species (ovate clubshell, southern clubshell, southern acornshell, upland combshell, Alabama moccasinshell, and blue shiner) are assumed to be extirpated from the Cahaba River drainage. The remaining nine aquatic species are considered present within refuge boundaries.

Two of the five plants from the county are restricted or associated with limestone outcroppings or glades. Limestone glades may be present within the refuge. Of the plants, only the Candidate species Georgia rockcress is found in general upland situations and has been documented as occurring on the refuge.

Two listed bird species and a butterfly are also found in the county. The red-cockaded woodpecker has not been recorded on the refuge and mature open pine forests required by this species are absent from the refuge. The wood stork in Alabama is found along larger river systems and impoundments. No wood storks have been reported on or near the refuge but may pass through the refuge during periods of

movement. The Mitchell's satyr butterfly has been documented in the Oakmulgee District of the Talladega National Forest to the south, but preferred habitat of wet meadows or wooded wetlands is not found in the project area.

Gray and Indiana bats may use the Cahaba River for foraging or as a travel corridor but no caves have been located within the refuge. The collapsed coal mine portal is clogged with debris and periodically inundated and does not provide habitat for bats. The bald eagle is no longer listed as threatened but is protected under the Bald and Golden Eagle Protection Act. Bald eagles are not known to nest on the refuge, but have been seen foraging along the Cahaba River within the refuge during the breeding period.

**VII. Determination of Effects:** The impacts to the listed species occurring on the refuge are anticipated to be beneficial over the long-term. The Draft CCP/EA for the refuge includes a table that summarized the environmental consequences of plan implementation.

**A. Explanation of effects of the action on species and critical habitats in item V. B (attach additional pages as needed):**

**Table 2. Project impacts to listed/proposed species/critical habitat**

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
All species listed in Table V. B	No adverse impacts anticipated.

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

The implementation of the goals, objectives, and strategies outlined in the Draft CCP/EA would follow the refuge's best management practices and would pursue avoidance and minimization of impacts to federally threatened and endangered species, to the extent possible and practicable.

Prescribed burning and invasive species removal programs detailed in the Draft CCP/EA are expected to benefit Georgia rockcress.

Despite the likely extirpation of ovate clubshell, southern clubshell, southern acornshell, upland combshell, Alabama moccasinshell, and blue shiner, these species would likely benefit from partnerships to establish new populations within the Cahaba River for recovery to be successful.

**Table 3. Conservation measures proposed to minimize or eliminate adverse impacts to proposed/listed species, critical habitat**

SPECIES/ CRITICAL HABITAT	ACTIONS TO MINIMIZE IMPACTS
All aquatic species listed in Table V.B	Management Goals in CCP

The following management goals were designed to meet refuge establishment purposes and define general targets in support of the refuge vision. These goals would attempt to protect existing populations and restore historic species to the refuge. The overall objective of improving biological integrity of refuge natural communities would benefit both federally listed species as well as other biota of the region.

- Goal 1:** Contribute to the conservation, enhancement, and restoration of native aquatic habitats of the Cahaba River to help maintain and assist in the recovery of federally listed species and to support native plants and animals.
- Goal 2:** Conserve, enhance, and restore native terrestrial habitats of the refuge to maintain and assist in the recovery of federally listed species and to support native plants and animals.
- Goal 3:** Conserve, manage, and restore populations of native animal species representative of the Cahaba River basin.
- Goal 4:** Ensure visitors of all abilities and varied interests participate in and enjoy the refuge for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation, whereby motivating them to value, support, and contribute to the refuge and Refuge System. Increase their understanding of the Cahaba River and upland habitats, and help them become better environmental stewards.
- Goal 5:** Promote public awareness, through the use of volunteers and increased cooperation with partners, of the resources of the Cahaba River refuge and the National Wildlife Refuge System. Encourage increased participation in achieving the desired future condition of the refuge.
- Goal 6:** Provide sufficient refuge infrastructure and staff to implement a comprehensive refuge management program in order to protect and manage the natural and cultural resources of the refuge.

**VIII. Effect Determination and Response Requested:**

**Table 4. The effect determination and response requested for impacts to each proposed/listed species/critical habitat.**

SPECIES/ CRITICAL HABITAT	DETERMINATION <sup>1</sup>			RESPONSE <sup>1</sup> REQUESTED
	NE	NA	AA	
All species listed in Table V.B		x		Concurrence

<sup>1</sup>DETERMINATION/RESPONSE REQUESTED:

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

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

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

\_\_\_\_\_  
**Signature** (originating station)                      **date**

\_\_\_\_\_  
**Title**

**IX. Reviewing Ecological Services Office Evaluation:**

**A. Concurrence** \_\_\_\_\_ **Non-concurrence** \_\_\_\_\_

**B. Formal consultation required** \_\_\_\_\_

**C. Conference required** \_\_\_\_\_

**D. Informal conference required** \_\_\_\_\_

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C. **Remarks (attach additional pages as needed):**

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Title**

\_\_\_\_\_  
**Office**

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## *Appendix H. Wilderness Review*

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

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

The lands within Cahaba River 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 plan.





## Appendix I. Refuge Biota

### FISH

Scientific Name	Common Name	Status		
		Federal (1)	Alabama (2)	Global (3)
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey			
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey			
<i>Lampetra aepyptera</i>	Least Brook Lamprey			
<i>Lepisosteus oculatus</i>	Spotted Gar			
<i>Lepisosteus osseus</i>	Longnose Gar			
<i>Amia calva</i>	Bowfin			
<i>Anguilla rostrata</i>	American Eel			
<i>Alosa alabamae</i>	Alabama Shad		P2	G2
<i>Alosa chrysochloris</i>	Skipjack Herring			
<i>Dorosoma cepedianum</i>	Gizzard Shad			
<i>Dorosoma petenense</i>	Threadfin Shad			
<i>Campostoma oligolepis</i>	Largescale Stoneroller			
<i>Cyprinella caerulea</i>	Blue Shiner	LT	SP, P2	G2
<i>Cyprinella callistia</i>	Alabama Shiner			
<i>Cyprinella trichroistia</i>	Tricolor Shiner			
<i>Cyprinella venusta</i>	Blacktail Shiner			

Scientific Name	Common Name	Status		
		Federal (1)	Alabama (2)	Global (3)
<i>Cyprinus carpio</i>	Common Carp			
<i>Ericymba buccata</i>	Silverjaw Minnow			
<i>Hybopsis winchelli</i>	Clear Chub			
<i>Luxilus chrysocephalus</i>	Striped Shiner			
<i>Lythrurus bellus</i>	Pretty Shiner			
<i>Lythrurus lirus</i>	Mountain Shiner			
<i>Macrhybopsis aestivallis</i>	Speckled Chub			
<i>Macrhybopsis storeriana</i>	Silver Chub			
<i>Nocomis leptocephalus</i>	Bluehead Chub			
<i>Notemigonus crysoleucas</i>	Golden Shiner			
<i>Notropis ammophilus</i>	Orangefin Shiner			
<i>Notropis asperifrons</i>	Burrhead Shiner			
<i>Notropis atherinoides</i>	Emerald Shiner			
<i>Notropis cahabae</i>	Cahaba Shiner	LE	SP, P1	G2
<i>Notropis chrosomus</i>	Rainbow Shiner			
<i>Notropis edwardraneyi</i>	Fluvial Shiner			
<i>Notropis stilbius</i>	Silverstripe Shiner			
<i>Notropis texanus</i>	Weed Shiner			
<i>Notropis uranoscopus</i>	Skygazer Shiner			G3

Scientific Name	Common Name	Status		
		Federal (1)	Alabama (2)	Global (3)
<i>Notropis volucellus</i>	<b>Mimic Shiner</b>			
<i>Phenacobius catostomus</i>	<b>Rifle Minnow</b>			
<i>Pimephales notatus</i>	<b>Bluntnose Minnow</b>			
<i>Pimephales vigilax</i>	<b>Bullhead Minnow</b>			
<i>Semotilus atromaculatus</i>	<b>Creek Chub</b>			
<i>Carpiodes cyprinus</i>	<b>Quillback</b>			
<i>Carpiodes velifer</i>	<b>Highfin Carpsucker</b>			
<i>Erimyzon oblongus</i>	<b>Creek Chubsucker</b>			
<i>Hypentelium etowanum</i>	<b>Alabama Hog Sucker</b>			
<i>Minytrema melanops</i>	<b>Spotted Sucker</b>			
<i>Moxostoma carinatum</i>	<b>River Redhorse</b>			
<i>Moxostoma duquesnei</i>	<b>Black Redhorse</b>			
<i>Moxostoma erythrurum</i>	<b>Golden Redhorse</b>			
<i>Moxostoma poecilurum</i>	<b>Blacktail Redhorse</b>			
<i>Ameiurus natalis</i>	<b>Yellow Bullhead</b>			
<i>Ictalurus punctatus</i>	<b>Channel Catfish</b>			
<i>Noturus gyrinus</i>	<b>Tadpole Madtom</b>			
<i>Noturus leptacanthus</i>	<b>Speckled Madtom</b>			
<i>Noturus nocturnus</i>	<b>Freckled Madtom</b>		P2	

Scientific Name	Common Name	Status		
		Federal (1)	Alabama (2)	Global (3)
<i>Pylodictis olivaris</i>	<b>Flathead Catfish</b>			
<i>Esox niger</i>	<b>Chain Pickerel</b>			
<i>Strongylura marina</i>	<b>Atlantic Needlefish</b>			
<i>Fundulus dispar</i>	<b>Northern Starhead Topminnow</b>			
<i>Fundulus olivaceus</i>	<b>Blackspotted Topminnow</b>			
<i>Fundulus stellifer</i>	<b>Southern Studfish</b>			
<i>Gambusia affinis</i>	<b>Mosquitofish</b>			
<i>Labidesthes sicculus</i>	<b>Brook Silverside</b>			
<i>Cottus carolinae</i>	<b>Banded Sculpin</b>			
<i>Ambloplites ariommus</i>	<b>Shadow Bass</b>			
<i>Lepomis cyanellus</i>	<b>Green Sunfish</b>			
<i>Lepomis gulosus</i>	<b>Warmouth</b>			
<i>Lepomis macrochirus</i>	<b>Bluegill</b>			
<i>Lepomis megalotis</i>	<b>Longear Sunfish</b>			
<i>Lepomis microlophus</i>	<b>Redear Sunfish</b>			
<i>Lepomis miniatus</i>	<b>Redspotted Sunfish</b>			
<i>Micropterus coosae</i>	<b>Redeye Bass</b>			
<i>Micropterus punctulatus</i>	<b>Spotted Bass</b>			
<i>Micropterus salmoides</i>	<b>Largemouth Bass</b>			

Scientific Name	Common Name	Status		
		Federal (1)	Alabama (2)	Global (3)
<i>Pomoxis annularis</i>	White Crappie			
<i>Poxomis nigromaculatus</i>	Black Crappie			
<i>Ammocrypta beani</i>	Naked Sand Darter			
<i>Ammocrypta meridiana</i>	Southern Sand Darter			
<i>Crystallaria asprella</i>	Crystal Darter			G3
<i>Etheostoma jordani</i>	Greenbreast Darter			
<i>Etheostoma ramseyi</i>	Alabama Darter			
<i>Etheostoma rupestre</i>	Rock Darter			
<i>Etheostoma stigmaeum</i>	Speckled Darter			
<i>Etheostoma whipplei</i>	Redfin Darter			
<i>Percina aurolineata</i>	Goldline Darter	LT	SP, P1	G2
<i>Percina breviceuda</i>	Coal Darter		P2	G2
<i>Percina lenticula</i>	Freckled Darter			G3
<i>Percina nigrofasciata</i>	Blackbanded Darter			
<i>Percina shumardi</i>	River Darter			
<i>Percina vigil</i>	Saddleback Darter			
<i>Percina kathae</i>	Mobile Logperch			
<i>Stizostedion vitreum</i>	Walleye			
<i>Aplodinotus grunniens</i>	Freshwater Drum			

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Sources: Mettee et al. 1996 and Alabama Natural Heritage Program 2006

(1) E=Federally Listed Endangered, T=Federally Listed Threatened, C=Candidate for Federal Listing

(2) SP=State Protected (Alabama Nongame Species Regulation, Section 220-2-.92 of the Alabama Regulations for 2003-2004 Game, Fish, and Fur Bearing Animals), P1=Species of Highest Conservation Concern, P2=Species of High Conservation Concern (Conserving Alabama's Wildlife: A Comprehensive Strategy).

(3) NatureServe Global Conservation Status Rank. G1=Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors. G2=Imperiled—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors. G3=Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors. Note – only G1-G3 ranks assigned in table.

## REPTILES AND AMPHIBIANS

Scientific Name	Common Name	Status		
		Federal (1)	Alabama (2)	Global (3)
<i>Acris crepitans</i>	Northern Cricket Frog			
<i>Acris gryllus</i>	Southern Cricket Frog			
<i>Agkistrodon contortrix</i>	Copperhead			
<i>Agkistrodon piscivorus</i>	Cottonmouth			
<i>Ambystoma maculatum</i>	Spotted Salamander			
<i>Anolis carolinensis</i>	Green Anole			
<i>Apalone spiniferus</i>	Spiny Softshell			
<i>Bufo fowleri</i>	Fowler's Toad			
<i>Carphophis amoenus</i>	Eastern Worm Snake			
<i>Cnemidophorus sexlineatus</i>	Eastern Six-lined Racerunner			
<i>Coluber constrictor</i>	Black Racer			
<i>Crotalus horridus</i>	Timber Rattlesnake			
<i>Desmognathus conanti</i>	Spotted Dusky Salamander			
<i>Desmognathus monticola</i>	Seal Salamander		SP	
<i>Diadophis punctatus</i>	Ringneck Snake			
<i>Elaphe obsoleta</i>	Gray Rat Snake			

Scientific Name	Common Name	Status		
		Federal (1)	Alabama (2)	Global (3)
<i>Eumeces fasciatus</i>	Five-lined Skink			
<i>Eumeces laticeps</i>	Broad-headed Skink			
<i>Eurycea cirrigera</i>	Two-lined Salamander			
<i>Eurycea guttolineata</i>	Three-lined Salamander			
<i>Gastrophryne carolinensis</i>	Eastern Narrowmouth Toad			
<i>Graptemys geographica</i>	Common Map Turtle			
<i>Graptemys nigrinoda</i>	Black-knobbed Map Turtle		SP	G3
<i>Graptemys pulchra</i>	Alabama Map Turtle		SP	
<i>Heterodon platyrhinos</i>	Eastern Hognose Snake			
<i>Hyla chrysoscelis</i>	Cope's Gray Treefrog			
<i>Hyla cinerea</i>	Green Treefrog			
<i>Lampropeltis getula</i>	Eastern Kingsnake		P2	
<i>Nerodia sipedon</i>	Midland Water Snake			
<i>Notopthalmus viridescens</i>	Red-spotted Newt			
<i>Opheodrys aestivus</i>	Rough Green Snake			
<i>Plethodon glutinosus</i>	Slimy Salamander			



Scientific Name	Common Name	Status		
		Federal (1)	Alabama (2)	Global (3)
<i>Plethodon ventralis</i>	<b>Southern Zigzag Salamander</b>			
<i>Plethodon websteri</i>	<b>Webster's Salamander</b>			
<i>Pseudacris brachyphona</i>	<b>Mountain Chorus Frog</b>			
<i>Pseudacris crucifer</i>	<b>Spring Peeper</b>			
<i>Pseudemys concinna</i>	<b>River Cooter</b>			
<i>Pseudotriton ruber</i>	<b>Red Salamander</b>			
<i>Rana catesbeiana</i>	<b>Bullfrog</b>			
<i>Rana clamitans</i>	<b>Green/Bronze Frog</b>			
<i>Rana sphenoccephala</i>	<b>Southern Leopard Frog</b>			
<i>Regina septemvittata</i>	<b>Queen Snake</b>			
<i>Sceloporus undulatus</i>	<b>Eastern Fence Lizard</b>			
<i>Scincella lateralis</i>	<b>Ground Skink</b>			
<i>Sternotherus minor</i>	<b>Stripeneck Musk Turtle</b>			
<i>Storeria dekayi</i>	<b>Brown Snake</b>			
<i>Storeria occipitomaculata</i>	<b>Red-bellied Snake</b>			
<i>Terrapene carolina</i>	<b>Eastern Box Turtle</b>			
<i>Thamnophis sirtalis</i>	<b>Eastern Garter Snake</b>			

Scientific Name	Common Name	Status		
		Federal (1)	Alabama (2)	Global (3)
<i>Trachemys scripta</i>	Slider			

Source: Godwin 2010

(1) E=Federally Listed Endangered, T=Federally Listed Threatened, C=Candidate for Federal Listing

(2) SP=State Protected (Alabama Nongame Species Regulation, Section 220-2-.92 of the Alabama Regulations for 2003-2004 Game, Fish, and Fur Bearing Animals), P1=Species of Highest Conservation Concern, P2=Species of High Conservation Concern (Conserving Alabama's Wildlife: A Comprehensive Strategy).

(3) NatureServe Global Conservation Status Rank. G1=Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors. G2=Imperiled—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors. G3=Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors. Note – only G1-G3 ranks assigned in table.

**BIRDS**

Scientific Name	Common Name	Spring	Summer	Fall	Winter
<b>Waterfowl</b>					
American Black Duck	<i>Anas rubripes</i>	-	-	-	o
American Wigeon	<i>Anas americana</i>	-	-	-	o
Blue-winged Teal	<i>Anas discors</i>	u	-	u	-
Canada Goose	<i>Branta canadensis</i>	o	o	o	o
Gadwall	<i>Anas strepera</i>	-	-	-	o
Green-winged Teal	<i>Anas crecca</i>	-	-	-	u
Hooded Merganser	<i>Lophodytes cucullatus</i>	u	o	u	u
Mallard	<i>Anas platyrhynchos</i>	u	-	u	u
Northern Pintail	<i>Anas acuta</i>	-	-	-	o
Northern Shoveler	<i>Anas clypeata</i>	u	-	u	u
Ring-necked Duck	<i>Aythya collaris</i>	u	-	u	u
Snow Goose	<i>Chen caerulescens</i>	-	-	-	r
Wood Duck (N)	<i>Aix sponsa</i>	u	u	u	u
<b>Turkey and Quail</b>					
Northern Bobwhite (N)	<i>Colinus virginianus</i>	f	f	f	f
Wild Turkey (N)	<i>Meleagris gallopavo</i>	u	u	u	u
<b>Loons and Grebes</b>					
Pied-billed Grebe	<i>Podilymbus podiceps</i>	o	o	o	o
<b>Cormorants</b>					
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	o	-	o	o
<b>Vultures</b>					
Black Vulture	<i>Coragyps atratus</i>	f	u	f	f

Scientific Name	Common Name	Spring	Summer	Fall	Winter
Turkey Vulture (N)	<i>Cathartes aura</i>	f	f	f	f
<b>Wading Birds</b>					
Great Blue Heron (N)	<i>Ardea herodias</i>	c	f	c	c
Great Egret	<i>Ardea alba</i>	o	o	o	o
Green Heron	<i>Butorides virescens</i>	u	u	u	-
Yellow-crowned Night-Heron	<i>Nyctanassa violacea</i>	u	u	u	-
<b>Raptors</b>					
American Kestrel	<i>Falco sparverius</i>	u	o	u	u
Bald Eagle	<i>Haliaeetus leucocephalus</i>	r	r	r	r
Broad-winged Hawk (N)	<i>Buteo platypterus</i>	f	f	f	-
Cooper's Hawk (N)	<i>Accipiter cooperii</i>	u	o	u	u
Mississippi Kite	<i>Ictinia mississippiensis</i>	-	r	r	-
Northern Harrier	<i>Circus cyaneus</i>	o	-	r	o
Osprey	<i>Pandion haliaetus</i>	u	o	u	-
Red-shouldered Hawk (N)	<i>Buteo lineatus</i>	u	u	u	u
Red-tailed Hawk (N)	<i>Buteo jamaicensis</i>	c	f	c	c
Sharp-shinned Hawk (N)	<i>Accipiter striatus</i>	u	r	u	u
<b>Shorebirds</b>					
American Woodcock	<i>Scolopax minor</i>	o	-	o	o
Killdeer (N)	<i>Charadrius vociferus</i>	f	f	f	f
Least Sandpiper	<i>Calidris minutilla</i>	o	-	o	-
Spotted Sandpiper	<i>Actitis macularia</i>	o	-	o	-

Scientific Name	Common Name	Spring	Summer	Fall	Winter
Wilson's Snipe	<i>Gallinago delicata</i>	o	-	o	o
<b>Waterbirds</b>					
Caspian Tern	<i>Sterna caspia</i>	r	-	r	-
Forster's Tern	<i>Sterna forsteri</i>	o	-	o	-
Herring Gull	<i>Larus argentatus</i>	r	-	r	r
Ring-billed Gull	<i>Larus delawarensis</i> )	r	-	r	r
<b>Doves and Pigeons</b>					
Mourning Dove (N)	<i>Zenaida macroura</i>	a	c	a	a
Rock Pigeon (E)	<i>Columba livia</i>	u	u	u	u
<b>Cuckoos</b>					
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	r	-	r	-
Yellow-billed Cuckoo (N)	<i>Coccyzus americanus</i>	c	c	c	-
<b>Owls</b>					
Barred Owl (N)	<i>Strix varia</i>	u	u	u	u
Eastern Screech-Owl (N)	<i>Otus asio</i>	u	u	u	u
Great Horned Owl (N)	<i>Bubo virginianus</i>	u	u	u	u
<b>Goatsuckers</b>					
Chuck-will's-widow (N)	<i>Caprimulgus carolinensis</i>	u	u	u	-
Common Nighthawk	<i>Chordeiles minor</i>	c	o	c	-
Whip-poor-will	<i>Caprimulgus vociferus</i>	o	o	o	-
<b>Swifts</b>					
Chimney Swift (N)	<i>Chaetura pelagica</i>	f	f	c	-
<b>Hummingbirds</b>					
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	f	f	c	-

Scientific Name	Common Name	Spring	Summer	Fall	Winter
(N)					
<b>Kingfishers</b>					
Belted Kingfisher (N)	<i>Ceryle alcyon</i>	f	u	f	f
<b>Woodpeckers</b>					
Downy Woodpecker (N)	<i>Picoides pubescens</i>	c	c	c	c
Hairy Woodpecker (N)	<i>Picoides villosus</i>	f	u	f	f
Northern Flicker (N)	<i>Colaptes auratus</i>	f	f	f	f
Pileated Woodpecker (N)	<i>Dryocopus pileatus</i>	f	f	f	f
Red-bellied Woodpecker (N)	<i>Melanerpes carolinus</i>	c	c	c	c
Red-headed Woodpecker (N)	<i>Melanerpes erythrocephalus</i>	u	u	u	u
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	f	-	f	f
<b>Flycatchers</b>					
Acadian Flycatcher (N)	<i>Empidonax virescens</i>	f	f	u	-
Alder Flycatcher	<i>Empidonax alnorum</i>	r	-	r	-
Eastern Kingbird (N)	<i>Tyrannus tyrannus</i>	c	f	c	-
Eastern Phoebe (N)	<i>Sayornis phoebe</i>	f	f	f	u
Eastern Wood-Pewee (N)	<i>Contopus virens</i>	f	f	f	-
Great Crested Flycatcher (N)	<i>Myiarchus crinitus</i>	f	f	f	-
Least Flycatcher	<i>Empidonax minimus</i>	r	-	r	-
Olive-sided Flycatcher	<i>Contopus cooperi</i>	r	-	r	-
Willow Flycatcher	<i>Empidonax traillii</i>	r	-	r	-

Scientific Name	Common Name	Spring	Summer	Fall	Winter
<b>Yellow-bellied Flycatcher</b>	<i>Empidonax flaviventris</i>	r	-	r	-
<b>Shrikes</b>					
<b>Loggerhead Shrike (N)</b>	<i>Lanius ludovicianus</i>	r	r	r	r
<b>Vireos</b>					
<b>Blue-headed Vireo</b>	<i>Vireo solitarius</i>	u	r	u	r
<b>Philadelphia Vireo</b>	<i>Vireo philadelphicus</i>	u	-	u	-
<b>Red-eyed Vireo (N)</b>	<i>Vireo olivaceus</i>	c	f	c	-
<b>White-eyed Vireo (N)</b>	<i>Vireo griseus</i>	c	f	c	-
<b>Yellow-throated Vireo (N)</b>	<i>Vireo flavifrons</i>	f	f	f	-
<b>Corvids</b>					
<b>American Crow (N)</b>	<i>Corvus brachyrhynchos</i>	a	a	a	a
<b>Blue Jay (N)</b>	<i>Cyanocitta cristata</i>	a	a	a	a
<b>Fish Crow</b>	<i>Corvus ossifragus</i>	u	u	u	u
<b>Swallows</b>					
<b>Bank Swallow</b>	<i>Riparia riparia</i>	u	-	u	-
<b>Barn Swallow (N)</b>	<i>Hirundo rustica</i>	c	f	c	-
<b>Cliff Swallow(N)</b>	<i>Petrochelidon pyrrhonota</i>	u	r	u	-
<b>Northern Rough-winged Swallow (N)</b>	<i>Stelgidopteryx serripennis</i>	f	f	f	-
<b>Purple Martin</b>	<i>Progne subis</i>	c	f	u	-
<b>Tree Swallow</b>	<i>Tachycineta bicolor</i>	u	-	u	-
<b>Chickadees and Titmice</b>					
<b>Carolina Chickadee (N)</b>	<i>Poecile carolinensis</i>	a	a	a	c

Scientific Name	Common Name	Spring	Summer	Fall	Winter
Tufted Titmouse (N)	<i>Parus bicolor</i>	a	a	a	c
<b>Nuthatches</b>					
Brown-headed Nuthatch (N)	<i>Sitta pusilla</i>	f	f	f	f
Red-breasted Nuthatch	<i>Sitta canadensis</i>	o	-	u	f
White-breasted Nuthatch (N)	<i>Sitta carolinensis</i>	c	c	c	c
<b>Wrens</b>					
Carolina Wren (N)	<i>Thryothorus ludovicianus</i>	a	a	a	a
House Wren	<i>Troglodytes aedon</i>	f	-	c	r
Sedge Wren	<i>Cistothorus platensis</i>	o	-	o	-
Winter Wren	<i>Troglodytes troglodytes</i>	u	-	u	f
<b>Kinglets</b>					
Golden-crowned Kinglet	<i>Regulus satrapa</i>	u	-	u	f
Ruby-crowned Kinglet	<i>Regulus calendula</i>	c	-	c	c
<b>Gnatcatchers</b>					
Blue-gray Gnatcatcher (N)	<i>Poliophtila caerulea</i>	c	c	c	r
<b>Thrushes</b>					
American Robin (N)	<i>Turdus migratorius</i>	c	f	c	c
Eastern Bluebird (N)	<i>Sialia sialis</i>	f	f	f	f
Gray-cheeked Thrush	<i>Catharus minimus</i>	u	-	u	-
Hermit Thrush	<i>Catharus guttatus</i>	u	-	u	f
Swainson's Thrush	<i>Catharus ustulatus</i>	f	-	f	-
Wood Thrush	<i>Hylocichla mustelina</i>	c	f	c	



Scientific Name	Common Name	Spring	Summer	Fall	Winter
(N)					-
Veery	<i>Catharus fuscescens</i>	u	-	u	-
<b>Mimids</b>					
Brown Thrasher (N)	<i>Toxostoma rufum</i>	c	c	c	c
Gray Catbird (N)	<i>Dumetella carolinensis</i>	f	f	c	r
Northern Mockingbird (N)	<i>Mimus polyglottos</i>	c	c	c	c
<b>Starlings</b>					
European Starling (E,N)	<i>Sturnus vulgaris</i>	c	c	c	c
<b>Waxwings</b>					
Cedar Waxwing	<i>Bombycilla cedrorum</i>	u	-	u	f
<b>Warblers</b>					
American Redstart (N)	<i>Setophaga ruticilla</i>	c	f	c	-
Bay-breasted Warbler	<i>Dendroica castanea</i>	f	-	u	-
Black-and-white Warbler (N)	<i>Mniotilta varia</i>	f	f	c	-
Blackburnian Warbler	<i>Dendroica fusca</i>	f	-	u	-
Blackpoll Warbler	<i>Dendroica striata</i>	f	-	-	-
Black-throated Blue Warbler (N)	<i>Dendroica caerulescens</i>	r	-	r	-
Black-throated Green Warbler	<i>Dendroica virens</i>	f	u	f	-
Blue-winged Warbler	<i>Vermivora pinus</i>	f	u	f	-
Canada Warbler	<i>Wilsonia canadensis</i>	u	-	u	-
Cape May Warbler	<i>Dendroica tigrina</i>	u	-	u	-

Scientific Name	Common Name	Spring	Summer	Fall	Winter
<b>Cerulean Warbler</b>	<i>Dendroica cerulea</i>	u	-	u	-
<b>Chestnut-sided Warbler</b>	<i>Dendroica pensylvanica</i>	f	-	f	-
<b>Common Yellowthroat (N)</b>	<i>Geothlypis trichas</i>	f	f	c	-
<b>Connecticut Warbler</b>	<i>Oporornis agilis</i>	r	-	r	-
<b>Golden-winged Warbler</b>	<i>Vermivora chrysoptera</i>	u	-	f	-
<b>Hooded Warbler (N)</b>	<i>Wilsonia citrina</i>	f	f	f	-
<b>Kentucky Warbler (N)</b>	<i>Oporornis formosus</i>	f	f	f	-
<b>Louisiana Waterthrush (N)</b>	<i>Seiurus motacilla</i>	c	f	u	-
<b>Magnolia Warbler</b>	<i>Dendroica magnolia</i>	f	-	c	-
<b>Mourning Warbler</b>	<i>Oporornis philadelphia</i>	r	-	r	-
<b>Nashville Warbler</b>	<i>Vermivora ruficapilla</i>	u	-	u	-
<b>Northern Parula (N)</b>	<i>Parula americana</i>	c	c	c	-
<b>Northern Waterthrush</b>	<i>Seiurus noveboracensis</i>	f	-	f	-
<b>Orange-crowned Warbler</b>	<i>Vermivora celata</i>	u	-	f	r
<b>Ovenbird</b>	<i>Seiurus aurocapillus</i>	f	u	f	-
<b>Palm Warbler</b>	<i>Dendroica palmarum</i>	f	-	f	o
<b>Pine Warbler (N)</b>	<i>Dendroica pinus</i>	c	c	c	c
<b>Prairie Warbler (N)</b>	<i>Dendroica discolor</i>	f	f	c	-
<b>Prothonotary Warbler (N)</b>	<i>Protonotaria citrea</i>	f	u	u	-
<b>Swainson's Warbler (N)</b>	<i>Limnothlypis swainsonii</i>	u	o	o	-

Scientific Name	Common Name	Spring	Summer	Fall	Winter
<b>Tennessee Warbler</b>	<i>Oreothlypis peregrina</i>	c	-	c	-
<b>Wilson's Warbler</b>	<i>Wilsonia pusilla</i>	u	-	u	-
<b>Worm-eating Warbler (N)</b>	<i>Helmitheros vermivorus</i>	f	f	f	-
<b>Yellow Warbler</b>	<i>Dendroica petechia</i>	u	-	u	-
<b>Yellow-breasted Chat (N)</b>	<i>Icteria virens</i>	f	f	f	-
<b>Yellow-rumped Warbler</b>	<i>Dendroica coronata</i>	c	-	f	a
<b>Yellow-throated Warbler (N)</b>	<i>Dendroica dominica</i>	f	c	f	-
<b>Tanagers</b>					
<b>Scarlet Tanager (N)</b>	<i>Piranga olivacea</i>	f	o	f	-
<b>Summer Tanager (N)</b>	<i>Piranga rubra</i>	c	c	c	-
<b>Sparrows</b>					
<b>Chipping Sparrow (N)</b>	<i>Spizella passerina</i>	f	u	f	f
<b>Dark-eyed Junco</b>	<i>Junco hyemalis</i>	f	-	f	c
<b>Eastern Towhee (N)</b>	<i>Pipilo erythrophthalmus</i>	c	c	c	c
<b>Field Sparrow (N)</b>	<i>Spizella pusilla</i>	f	f	f	f
<b>Fox Sparrow</b>	<i>Passerella iliaca</i>	u	-	u	u
<b>Lincoln's Sparrow</b>	<i>Melospiza lincolnii</i>	r	-	r	r
<b>Savannah Sparrow</b>	<i>Passerculus sandwichensis</i>	u	-	u	u
<b>Song Sparrow</b>	<i>Melospiza melodia</i>	f	-	f	c
<b>Swamp Sparrow</b>	<i>Melospiza georgiana</i>	u	-	u	u
<b>Vesper Sparrow</b>	<i>Pooecetes gramineus</i>	o	-	o	o

Scientific Name	Common Name	Spring	Summer	Fall	Winter
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	o	-	o	o
White-throated Sparrow	<i>Zonotrichia albicollis</i>	f	-	f	c
<b>Cardinals</b>					
Blue Grosbeak (N)	<i>Guiraca caerulea</i>	f	f	c	-
Indigo Bunting (N)	<i>Passerina cyanea</i>	c	a	c	-
Northern Cardinal (N)	<i>Cardinalis cardinalis</i>	a	a	a	a
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	f	-	f	-
<b>Icterids</b>					
Baltimore Oriole	<i>Icterus galbula</i>	o	-	o	-
Brown-headed Cowbird (N)	<i>Molothrus ater</i>	c	c	c	c
Common Grackle (N)	<i>Quiscalus quiscula</i>	c	c	c	c
Eastern Meadowlark (N)	<i>Sturnella magna</i>	c	f	c	c
Orchard Oriole (N)	<i>Icterus spurius</i>	c	f	c	-
Red-winged Blackbird (N)	<i>Agelaius phoeniceus</i>	c	c	c	c
Rusty Blackbird	<i>Euphagus carolinus</i>	u	-	u	u
<b>Finches</b>					
American Goldfinch (N)	<i>Carduelis tristis</i>	f	f	f	c
House Finch (N)	<i>Carpodacus mexicanus</i>	c	c	c	c
House Sparrow (E,N)	<i>Passer domesticus</i>	u	u	u	u
Pine Siskin	<i>Carduelis pinus</i>	o	-	o	u
Purple Finch	<i>Carpodacus purpureus</i>	u	-	u	u

Scientific Name	Common Name	Spring	Summer	Fall	Winter
<p><b>Key:</b>  a – abundant. Numerous and widespread  c – common. Likely to be present and observed  E – exotic (non-native)  f – fairly common. Occurs annually  N - confirmed or suspected to nest on refuge  o – occasional. Occurs only a few times during a season, or restricted in distribution  r – rare. Not observed every year  u – uncommon. Present, but not certain to be observed</p>					

## MAMMALS

Common Name	Scientific Name
Virginia Opossum	<i>Didelphis virginiana</i>
Southern Short-tailed Shrew	<i>Blarina carolinensis</i>
Southeastern Shrew	<i>Sorex longirostris</i>
Least Shrew	<i>Cryptotis parva</i>
Southeastern Shrew	<i>Sorex longirostris</i>
Eastern Mole	<i>Scalopus aquaticus</i>
Gray Bat	<i>Myotis grisecens</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Southeastern Myotis	<i>Myotis austroriparius</i>
Northern Long-eared Bat	<i>Myotis septentrionalis</i>
Indiana Bat	<i>Myotis sodalis</i>
Eastern Red Bat	<i>Lasiurus borealis</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Seminole Bat	<i>Lasiurus seminolus</i>

<b>Common Name</b>	<b>Scientific Name</b>
<b>Silver-haired Bat</b>	<i>Lasionycteris noctivagans</i>
<b>Eastern Pipistrelle</b>	<i>Pipistrellus subflavus</i>
<b>Big Brown Bat</b>	<i>Eptesicus fuscus</i>
<b>Evening Bat</b>	<i>Nycticeius humeralis</i>
<b>Rafinesque's Big-eared Bat</b>	<i>Corynorhinus rafinesquii</i>
<b>Brazilian Free-tailed Bat</b>	<i>Tadarida brasiliensis</i>
<b>Nine-banded Armadillo</b>	<i>Dasypus novemcinctus</i>
<b>Swamp Rabbit</b>	<i>Sylvilagus aquaticus</i>
<b>Eastern Cottontail</b>	<i>Sylvilagus floridanus</i>
<b>Eastern Chipmunk</b>	<i>Tamias striatus</i>
<b>Woodchuck</b>	<i>Marmota monax</i>
<b>Eastern Gray Squirrel</b>	<i>Sciurus carolinensis</i>
<b>Eastern Fox Squirrel</b>	<i>Sciurus niger</i>
<b>Southern Flying Squirrel</b>	<i>Glaucomys volans</i>
<b>American Beaver</b>	<i>Castor canadensis</i>
<b>Marsh Rice Rat</b>	<i>Oryzomys palustris</i>
<b>Eastern Harvest Mouse</b>	<i>Reithrodontomys humulis</i>
<b>Cotton Mouse</b>	<i>Peromyscus gossypinus</i>
<b>White-footed Mouse</b>	<i>Peromyscus leucopus</i>
<b>Oldfield Mouse</b>	<i>Peromyscus polionotus</i>
<b>Golden Mouse</b>	<i>Ochrotomys nuttalli</i>
<b>Hispid Cotton Rat</b>	<i>Sigmodon hispidus</i>
<b>Eastern Wood Rat</b>	<i>Neotoma floridana</i>
<b>Woodland Vole</b>	<i>Microtus pinetorum</i>

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<b>Common Name</b>	<b>Scientific Name</b>
<b>Common Muskrat</b>	<i>Ondatra zibethicus</i>
<b>Black Rat</b>	<i>Rattus rattus</i>
<b>Norway Rat</b>	<i>Rattus norvegicus</i>
<b>House Mouse</b>	<i>Mus musculus</i>
<b>Coyote</b>	<i>Canis latrans</i>
<b>Red Fox</b>	<i>Vulpes vulpes</i>
<b>Common Gray Fox</b>	<i>Urocyon cinereoargenteus</i>
<b>Northern Raccoon</b>	<i>Procyon lotor</i>
<b>Long-tailed Weasel</b>	<i>Mustela frenata</i>
<b>American Mink</b>	<i>Mustela vison</i>
<b>Northern River Otter</b>	<i>Lontra canadensis</i>
<b>Eastern Spotted Skunk</b>	<i>Spilogale putorius</i>
<b>Striped Skunk</b>	<i>Mephitis mephitis</i>
<b>Eastern Spotted Skunk</b>	<i>Spilogale putorius</i>
<b>Bobcat</b>	<i>Lynx rufus</i>
<b>White-tailed Deer</b>	<i>Odocoileus virginianus</i>
<b>Feral Swine</b>	<i>Sus scrofa</i>

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## PLANTS

Scientific Name	Common Name
<i>Acer barbatum</i>	florida maple
<i>Acer negundo</i>	box elder
<i>Acer rubrum</i>	red maple
<i>Acer saccharum</i>	sugar maple
<i>Aesculus pavia</i>	red buckeye
<i>Albizia julibrissin</i>	mimosa
<i>Allium canadense</i>	wild garlic
<i>Alternanthera philoxeroides</i>	alligator-weed
<i>Ambrosia artemisiifolia</i>	ragweed
<i>Ampelopsis arborea</i>	pepper-vine
<i>Andropogon gerardii</i>	big bluestem
<i>Andropogon virginicus</i>	broomsedge
<i>Andropogon virginicus and Andropogon glomeratus</i>	various beardgrasses
<i>Anemone americana</i>	round-lobed hepatica
<i>Aristida stricta</i>	wiregrass
<i>Arundinaria gigantea var. gigantea</i>	giant cane
<i>Asclepias tuberosa</i>	butterfly-weed
<i>Asimina parviflora</i>	dwarf pawpaw
<i>Betula nigra</i>	river birch
<i>Bignonia capreolata</i>	cross-vine
<i>Briza minor</i>	little quaking grass
<i>Carex digitalis</i>	wood sedge
<i>Carex picta</i>	painted sedge
<i>Carpinus caroliniana</i>	American hornbeam
<i>Carya alba</i>	mockernut hickory
<i>Carya glabra</i>	pignut hickory
<i>Celtis laevigata</i>	sugarberry
<i>Centrosema virginiana</i>	butterfly pea
<i>Cephalanthus occidentalis</i>	buttonbush
<i>Chasmanthium sessiliflorum</i>	longleaf spikegrass



Scientific Name	Common Name
<i>Clematis glaucophylla</i>	Whiteleaf Leatherflower
<i>Clematis virginiana</i>	virgin's bower
<i>Cnidoscolus stimulosus</i>	tread-softly
<i>Colocasia esculenta</i>	wild taro
<i>Corallorhiza wisteriana</i>	spring coralroot
<i>Coreopsis major</i>	whorled tickseed
<i>Cornus florida</i>	flowering dogwood
<i>Croton alabamensis</i> var. <i>alabamensis</i>	Alabama croton
<i>Cyrilla racemiflora</i>	titi
<i>Desmodium</i> spp.	tick-trefoils
<i>Dichanthelium commutatum</i>	panic-grass
<i>Diospyros virginiana</i>	persimmon
<i>Dryopteris marginalis</i>	wood fern
<i>Epifagus virginiana</i>	beechdrops
<i>Euonymus americanus</i>	strawberry-bush
<i>Eupatorium capillaceum</i>	dog fennel
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort
<i>Euphorbia corollata</i>	flowering spurge
<i>Fagus grandifolia</i>	beech
<i>Festuca arundinacea</i>	tall fescue
<i>Fraxinus americana</i>	white ash
<i>Fraxinus pennsylvanica</i>	green ash
<i>Gentiana saponaria</i>	soapwort gentian
<i>Gentiana villosa</i>	striped gentian
<i>Halesia tetraptera</i> var. <i>tetraptera</i>	common silverbell
<i>Hamamelis virginiana</i>	witch hazel
<i>Helenium amarum</i>	bitterweed
<i>Helianthus divaricatus</i>	woodland sunflower
<i>Hemerocallis fulva</i>	orange day-lily
<i>Hexastylis arifolia</i> var. <i>arifolia</i>	heartleaf ginger
<i>Hibiscus syriacus</i>	rose-of-sharon

Scientific Name	Common Name
<i>Hydrangea quercifolia</i>	<b>oakleaf hydrangea</b>
<i>Hymenocallis coronaria</i>	<b>Cahaba lilies</b>
<i>Ilex opaca</i>	<b>American holly</b>
<i>Ipomoea pandurata</i>	<b>wild potato vine</b>
<i>Iris cristata</i>	<b>dwarf crested iris</b>
<i>Iris verna</i> var. <i>smalliana</i>	<b>dwarf iris</b>
<i>Juncus effusus</i> var. <i>solutus</i>	<b>soft rush</b>
<i>Justicia americana</i>	<b>water-willow</b>
<i>Kalmia latifolia</i>	<b>mountain laurel</b>
<i>Lathyrus venosus</i>	<b>smooth veiny peavine</b>
<i>Leptopus phyllanthoides</i>	<b>maidenbush</b>
<i>Lespedeza bicolor</i>	<b>Japanese bush-clover</b>
<i>Lespedeza cuneata</i>	<b>Chinese bush-clover</b>
<i>Ligustrum sinense</i>	<b>Chinese privet</b>
<i>Liquidambar styraciflua</i>	<b>sweetgum</b>
<i>Liriodendron tulipifera</i>	<b>tuliptree</b>
<i>Listera australis</i>	<b>southern twayblade</b>
<i>Lonicera japonica</i>	<b>Japanese honeysuckle</b>
<i>Magnolia macrophylla</i>	<b>bigleaf magnolia</b>
<i>Marshallia morhii</i>	<b>Mohr's Barbara-Button</b>
<i>Marshallia trinervia</i>	<b>Broadleaf Barbara-buttons</b>
<i>Mecardonia acuminata</i>	<b>axil-flower</b>
<i>Melanthium latifolium</i>	<b>slender bunchflower</b>
<i>Melica mutica</i>	<b>melic grass</b>
<i>Microstegium vimineum</i>	<b>nepal grass</b>
<i>Mitchella repens</i>	<b>partridgeberry</b>
<i>Monarda fistulosa</i>	<b>wild bergamot</b>
<i>Monotropa hypopithys</i>	<b>American pinesap</b>
<i>Nyssa sylvatica</i>	<b>blackgum</b>
<i>Onoclea sensibilis</i>	<b>sensitive fern</b>
<i>Ostrya virginiana</i>	<b>hop hornbeam</b>

<i>Oxydendrum arboreum</i>	sourwood
Scientific Name	Common Name
<i>Panax quinquefolius</i>	American ginseng
<i>Panicum virgatum</i>	switchgrass
<i>Parthenocissus quinquefolia</i>	virginia creeper
<i>Paspalum urvillei</i>	vasey grass
<i>Paulownia tomentosa</i>	princess-tree
<i>Perilla frutescens</i>	beefsteak plant
<i>Phlox amoena</i>	hairy phlox
<i>Phlox divaricata</i>	blue phlox
<i>Phlox pulchra</i>	Wherry's phlox
<i>Pinus echinata</i>	shortleaf pine
<i>Pinus palustris</i>	longleaf pine
<i>Pinus taeda</i>	loblolly pine
<i>Pinus virginiana</i>	Virginia pine
<i>Pityopsis graminifolia</i>	grass-leaf golden-aster
<i>Pityopsis spp.</i>	golden-asters
<i>Platanus occidentalis</i>	sycamore
<i>Polystichum acrostichoides</i>	Christmas fern
<i>Poncirus trifoliata</i>	trifoliolate orange
<i>Potentilla simplex</i>	common cinquefoil
<i>Prunella vulgaris</i>	selfheal
<i>Prunus serotina</i>	black cherry
<i>Pteridium aquilinum var. pseudocaudatum</i>	bracken fern
<i>Pueraria montana</i>	kudzu
<i>Pycnanthemum spp.</i>	mountain mints
<i>Pyracantha koidzumii</i>	formosa firethorn
<i>Quercus alba</i>	white oak
<i>Quercus coccinea</i>	scarlet oak
<i>Quercus falcate</i>	southern red oak
<i>Quercus hemisphaerica</i>	upland laurel oak
<i>Quercus margarettiae</i>	sand post oak
<i>Quercus marilandica</i>	blackjack oak

Scientific Name	Common Name
<i>Quercus nigra</i>	water oak
<i>Quercus prinus</i>	chestnut oak
<i>Quercus rubra</i>	red oak
<i>Quercus stellate</i>	post oak
<i>Quercus veluntina</i>	black oak
<i>Rhododendron canescens</i>	hoary azalea
<i>Salix caroliniana</i>	Carolina willow
<i>Salix nigra</i>	black willow
<i>Salvia azurea</i>	blue sage
<i>Sanguinaria canadensis</i>	bloodroot
<i>Saururus cernuus</i>	lizard's-tail
<i>Schizachyrium scoparium</i>	little bluestem
<i>Sedum nevii</i>	Nevius' stonecrop
<i>Senna occidentalis</i>	coffee senna
<i>Sericocarpus tortifolius</i>	white-topped aster
<i>Sida elliotii</i>	Elliott's fanpetals
<i>Smilax glauca and Smilax rotundifolia</i>	briers
<i>Solidago caesia</i>	bluestem goldenrod
<i>Solidago canadensis</i>	canada goldenrod
<i>Solidago odora var. odora</i>	sweet goldenrod
<i>Sorghastrum nutans</i>	indian grass
<i>Spigelia gentianoides var. alabamensis)</i>	Gentian pinkroot
<i>Stewartia malacodendron</i>	silky camellia
<i>Stylosanthes biflora</i>	pencil flower
<i>Symphotrichum concolor</i>	silvery aster
<i>Symphotrichum dumosum</i>	bushy aster
<i>Symphotrichum georgianum</i>	Georgia aster
<i>Symphotrichum patens var. patens</i>	late purple aster
<i>Symplocos tinctoria</i>	horse sugar
<i>Symplocos tinctoria</i>	sweetleaf
<i>Tephrosia virginiana</i>	goat's-rue

<i>Thalictrum thalictroides</i>	rue anemone
<b>Scientific Name</b>	<b>Common Name</b>
<i>Tilia americana</i> var. <i>heterophylla</i>	white basswood
<i>Toxicodendron radicans</i>	poison ivy
<i>Trillium cuneatum</i>	cuneate trillium
<i>Tripsacum dactyloides</i>	gama grass
<i>Ulmus alata</i>	winged elm
<i>Ulmus americana</i>	American elm
<i>Vaccinium arboreum</i>	tree sparkelberry
<i>Vaccinium elliotii</i>	Elliott's blueberry
<i>Vaccinium pallidum</i>	Blue Ridge blueberry
<i>Verbena brasiliensis</i>	Brazilian vervain
<i>Viola affinis</i>	blue violet
<i>Vitis rotundifolia</i>	muscadine grape
<i>Wisteria sinensis</i>	Chinese wisteria
<i>Yucca flaccida</i>	Adam's needle



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## *Appendix J. List of Preparers*

A core planning team was developed to participate in planning team meetings; gather information; develop key components (e.g., develop vision, goals, objectives, and strategies) of the plan; prepare maps; write portions of the plan and environmental assessment; and assist with public meetings. The core team consisted of the following members:

1. Sarah Clardy                      Refuge Manager/USFWS/Cahaba River NWR
2. Emery Hoyle                      Deputy Project Leader/USFWS/Wheeler NWR
3. Oliver van den Ende              Planner/USFWS/Wheeler NWR
4. Rose Hopp                         Planner/USFWS/Southeast Regional Office
5. Laura Housh                      Planner/USFWS/Gulf Coast Complex

In addition, an extended planning team was formed. The extended team's functions included further development of the vision statement and goals, outlining priority issues, forming management alternatives, developing management objectives and strategies, and reviewing documents. The extended planning team included the following members:

### *ALABAMA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES*

- Chris Cook                         Technical Assistance Biologist/Demopolis WMA
- Paul Johnson                      Director/ Alabama Aquatic Biodiversity Center
- Chas Moore                        Area Biologist/Cahaba River WMA
- Mike Sievering                    Supervisory Wildlife Biologist/District III

### *ALABAMA FORESTRY COMMISSION*

- Jarred Cornegay                  Forester/Bibb County
- Sammy Holdsambeck            Forester/Bibb County

### *U.S. FOREST SERVICE*

- Cindy Ragland                    District Ranger/USFS/Talladega National Forest

### *U.S. FISH AND WILDLIFE SERVICE*

- Dwight Cooley                    Project Leader/USFWS/Wheeler NWR
  - Rob Hurt                          Biologist/USFWS/Wheeler NWR
  - Bill Gates                         Biologist/USFWS/Wheeler NWR
  - Teresa Adams                    Supervisory Park Ranger/USFWS/Wheeler NWR
  - Rick Kanaski                     Regional Archeologist/Regional Office
  - Eric Spadgenske                 Biologist/Alabama Ecological Services Field Office
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