SECTION B

Barred owl
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I. Background

Introduction

This Environmental Assessment for Bayou Cocodrie National Wildlife Refuge has been prepared in compliance with the National Environmental Policy Act. It discusses the purpose and need for the comprehensive conservation plan for the refuge which is located in Concordia Parish, Louisiana, (Figure 16), and provides an analysis of the impacts that could be expected from each of the management proposals outlined in the plan. This analysis assists the Fish and Wildlife Service in determining if it will need to prepare an Environmental Impact Statement or a Finding of No Significant Impact for the refuge.

The Fish and Wildlife Service is the Nation's primary conservation agency concerned with the protection and long-term management of wildlife resources. The Service administers the National Wildlife Refuge System, a system of more than 530 national wildlife refuges covering over 93 million acres, much of which is primarily managed for the enhancement of migratory bird populations and federally listed threatened/endangered fish, wildlife, and plants. Of particular interest in the Lower Mississippi Valley is the plight of migratory bird resources, and the declining population of the Louisiana black bear due to the significant loss of bottomland hardwood forests. As a result, the Service is directing management emphasis on the recovery of these species at Bayou Cocodrie National Wildlife Refuge.

Purpose And Need For Action

The purpose of the comprehensive conservation plan and environmental assessment is to establish and implement management direction for Bayou Cocodrie National Wildlife Refuge for the next 15 years.

The environmental assessment is needed to determine and evaluate a range of reasonable management alternatives for the refuge. Each alternative was generated with the potential to be fully developed into a final comprehensive conservation plan and to describe the predicted biological, physical, social, and economical impacts of implementing each alternative. The Fish and Wildlife Service will select an alternative to be fully developed for this refuge.

The Service identified issues, concerns, and needs through discussions with the public, agency managers, conservation partners, and others. In particular, the Service's planning team identified a range of alternatives, evaluated the possible consequences of implementing each, and selected Alternative B as the proposed management action. In the opinion of the Service and the planning team, Alternative B is the best approach to guide the refuge's future direction.

There is no current plan that identifies priorities and ensures consistent and integrated management of the refuge, thus necessitating the need for this plan. The National Wildlife Refuge System Improvement Act of 1997 requires that all national wildlife refuges have a comprehensive conservation plan in place within 15 years.

Decisions To Be Made

Based on the assessment described in this document, the Fish and Wildlife Service will select an alternative to implement the final Comprehensive Conservation Plan for Bayou Cocodrie National Wildlife Refuge. A Finding of No Significant Impact 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

Figure 16. Refuge Location

Service and refuge system mission, the purposes for which the refuge was established, and other legal mandates. Assuming no significant impact is found, implementation of the plan will begin and will be monitored annually and revised when necessary.

Planning Study Area

Bayou Cocodrie National Wildlife Refuge is located in east-central Louisiana, 13 miles west of the Mississippi River and Natchez, Mississippi. The city of Ferriday is the nearest community located about 4 miles northeast of the refuge.

The planning study area for this environmental assessment includes lands outside the existing refuge acquisition boundary that are being studied for inclusion in the refuge system and/or partnership planning efforts. It also includes portions of the Lower Mississippi Valley watershed that affect the planning study area. The Fish and Wildlife Service presently owns and manages 13,168 acres of the 22,269 acres identified as being within the refuge acquisition boundary. The Service will continue to seek to acquire, from willing sellers, the remaining acres. This environmental assessment will identify management on refuge lands, as well as those lands proposed to be acquired by the Service (Figure 17).

Discussing Issues
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Comprehensive Conservation Planning Process And Issue Identification

A mailing list of organizations and individuals was compiled to ensure that the refuge was contacting a wide array of interested people. Announcements giving the location, date, and time for the first scoping meeting appeared in local newspapers and were furnished to local residents. Input obtained from the scoping meeting and discussions held with state and local officials, civic groups, and conservation organizations were used to develop the draft plan.

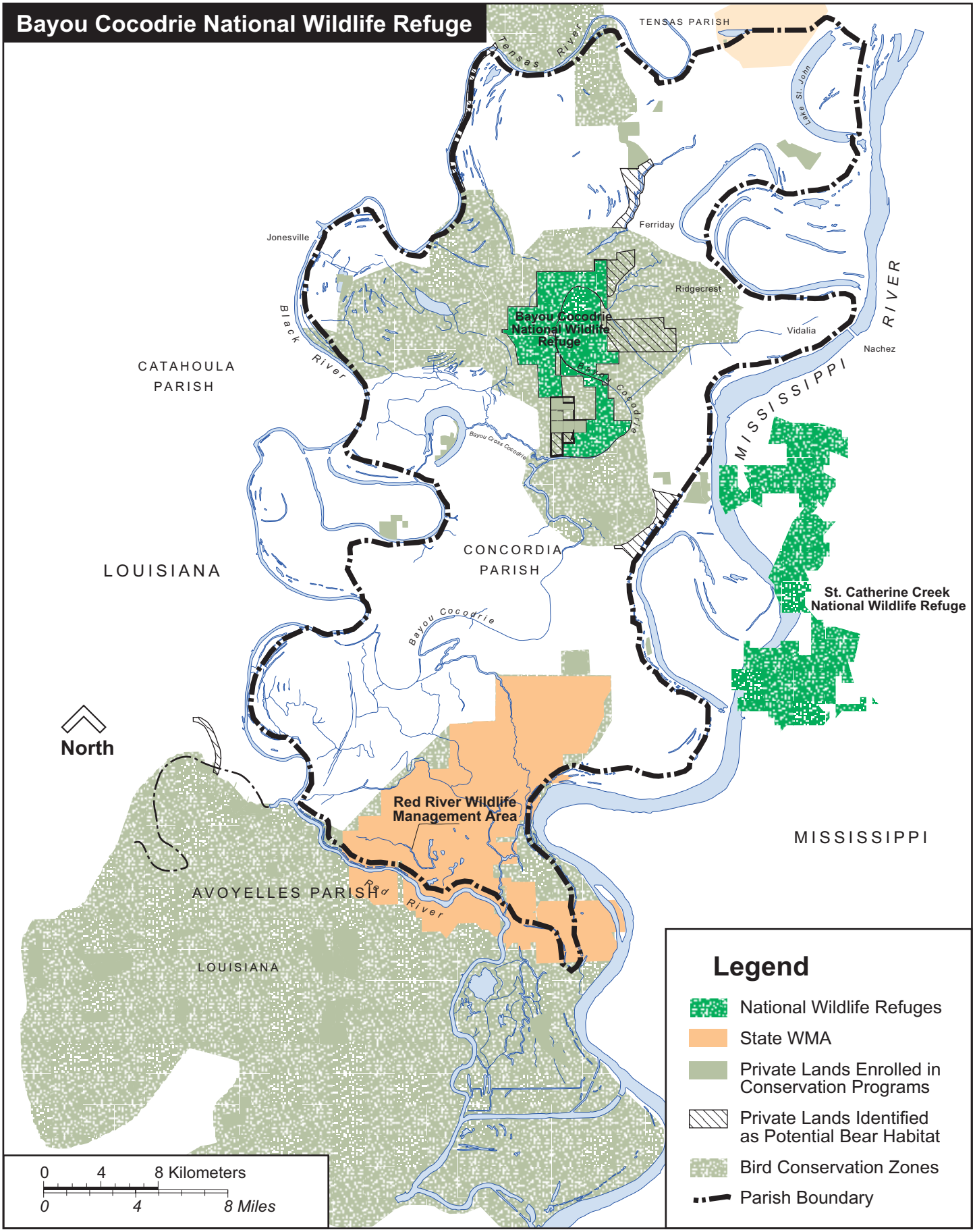
Beginning with the development of the draft plan, the planning team identified a list of issues and concerns likely to be associated with the management of the refuge. These issues and concerns were expanded to include ideas generated by citizens from the local community. The refuge staff contacted local civic groups, as well as federal, state, and local agency representatives to gather additional issues and concerns and to respond to preliminary alternatives developed by the planning team in 1999.

Together with refuge goals, key issues, and a range of options, a basis was formed for the development and comparison of the management alternatives described in this document. The comments received from the internal agency review, open house, and other responses from the public will be forthcoming following review of this draft and will assist the Service in refining the range of alternatives described in this section. Several significant key issues or problems formed the basis for the development and comparison of the different alternatives described in Chapter III.

Managing Fish, Wildlife, and Habitats

Restoring biological diversity, connectivity, and the ecological functionality of bottomland hardwood forests to support forest breeding bird populations and the sub-population Louisiana black bear is an important issue expressed by the Service and The Nature Conservancy.

Figure 17. Planning Study Area



Controlling Problem Species

The need to focus management attention on the control of invasive or problem species, including deer, beaver, feral hog, brown-headed cowbird, cormorant, and raccoon and their effects on other wildlife, crops, and catfish production was expressed by Service staff and nearby landowners.

Managing Facilities and Staff

The need to move toward designation and management of the old growth forest tract in the Brooks Brake Unit as a Research Natural Area was a concern. The need to improve management of forest habitats to conserve forest interior birds within all management units was considered a major concern.

Increasing Hunting, Wildlife Viewing, and Environmental Education Opportunities

There was an overall concern that the Service did not have sufficient staff to effectively manage the refuge for both wildlife and visitors. The Louisiana Department of Wildlife and Fisheries would like to see the refuge increase white-tailed deer and small game hunting opportunities. It was noted by the Service that current access for hunting may be a limiting factor. There are limited opportunities to access the refuge for fishing opportunities, to view and photograph wildlife, and to learn about refuge resources.

II. Alternatives

Formulation Of Alternatives

Alternatives are different approaches or combinations of management objectives and strategies designed to achieve the refuge purpose, vision, and the goals identified in the comprehensive conservation plan; the priorities and goals of the Lower Mississippi Valley Ecosystem Team; the goals of the National Wildlife Refuge System; and the mission of the Fish and Wildlife 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 and restoration of fish, wildlife, plants, habitats, and other resources. A major consideration in the formulation of the alternatives is the ability to obtain sufficient proprietary interest in lands to facilitate a physical and biological connection of bottomland hardwood forests, and to restore the function and habitat diversity once found in this area. In particular, bottomland hardwood forests serve as migration corridors and stop-over habitat for many migratory birds. Private landowners and wildlife managers recognize the multiple ecological, social, and economic values of functional bottomland hardwood ecosystems.

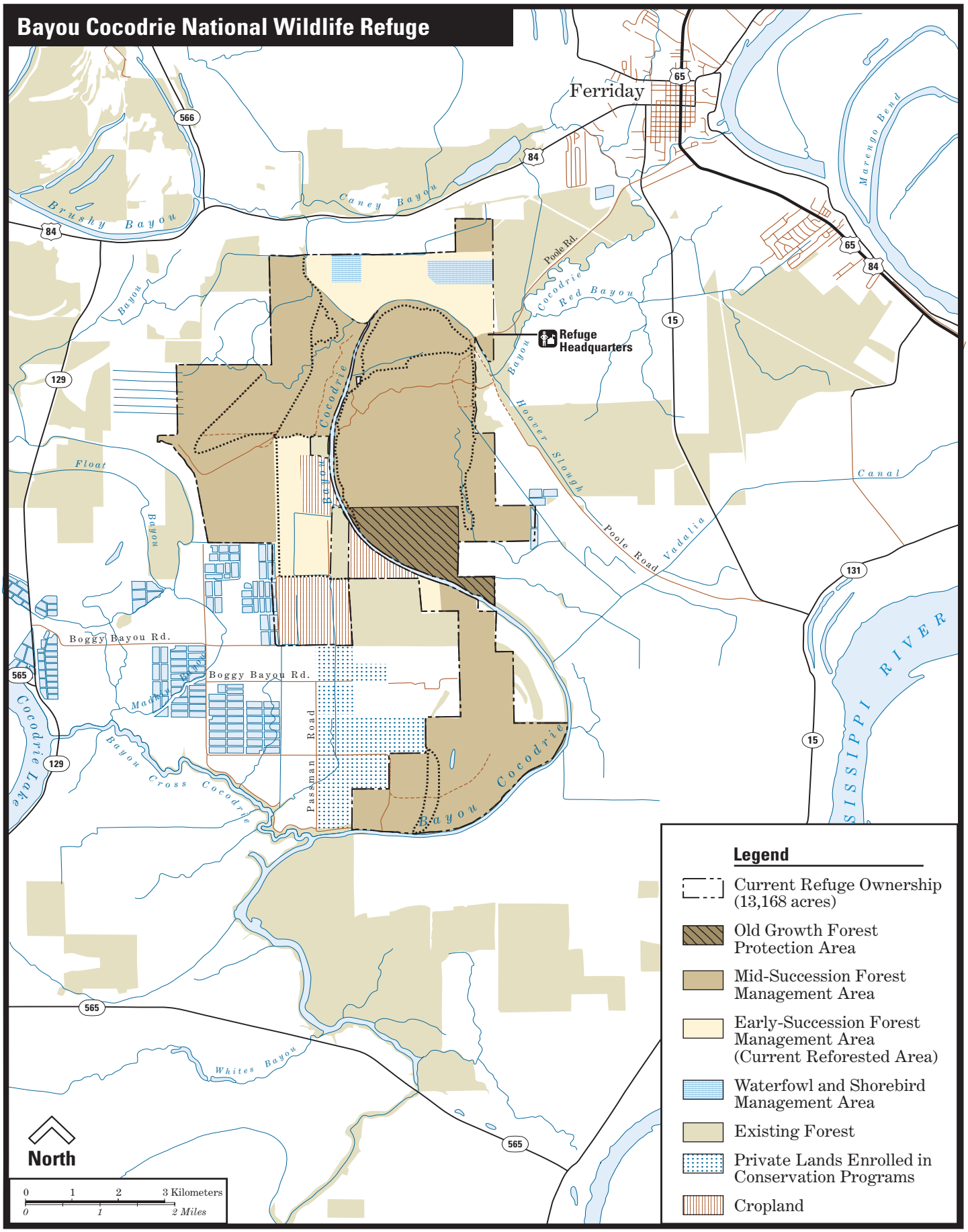
Refuge managers assessed biological conditions and analyzed external relationships affecting the refuge (Figure 19). This information contributed to the development of goals and objectives and, in turn, alternative formulation. As a result, each alternative presents different sets of objectives and strategies for reaching long-term goals. Each alternative was evaluated based on how much progress it will make and how it will address core habitat issues, problems, and wildlife threats.

Problems and threats provide important perspective and guidance in developing alternatives. Trends in habitat and wildlife uses were evaluated, as was the capability of refuge habitat to support these uses. The vegetative change of forest structure from past logging activities and various water development projects contributed to the loss of wildlife habitat. Overall, the greatest risk to fish, wildlife, plants, and wildlife habitats in the Lower Mississippi Valley is characterized by the lack of forest structural composition and connectivity. As a result, the Service has identified reforestation and restoration of forest structure as important to address these risks.

Description Of Alternatives

Serving as a basis for each alternative, goals and sets of objectives and strategies were developed by managers which lead to the fulfillment of the refuge purpose and the National Wildlife Refuge System mission. Objectives are desired conditions or outcomes that are grouped into sets and for this planning effort, consolidated into three alternatives. These alternatives, overall, represent a range of different management treatments or approaches for managing the refuge over a 15-year time frame. The three preliminary alternatives are summarized below. Following the summary descriptions is a table which depicts the goals, objectives, and strategies formulated for each alternative.

Figure 18. Existing Conditions



Alternative A - No Action

This alternative represents no change from current management of the refuge. Management emphasis would continue to focus around acquiring private properties within the refuge acquisition boundary to sustain resident populations, including white-tailed deer, and to serve as a safe harbor for black bear movement. Of the total refuge acquisition boundary of 22,269 acres, the Service has acquired 13,168 acres thus far. Therefore, lands available for acquisition within the current refuge acquisition boundary total 9,101 acres. As refuge in-holdings are acquired, all tracts will be reforested to improve conditions for migratory birds, especially migratory songbirds (passerines). On average, the existing staff can plant approximately 500 acres annually. Alternative A represents the anticipated conditions of the refuge from 2000 until 2015, if current policies, programs, and activities continue. The reader will be able to compare Alternatives B and C to conditions as they are likely to be in 15 years under Alternative A. Alternative A is a prediction of future conditions and land protection efforts by the Service, which serves as a benchmark against which the impact of other alternatives can be measured (Figure 20).

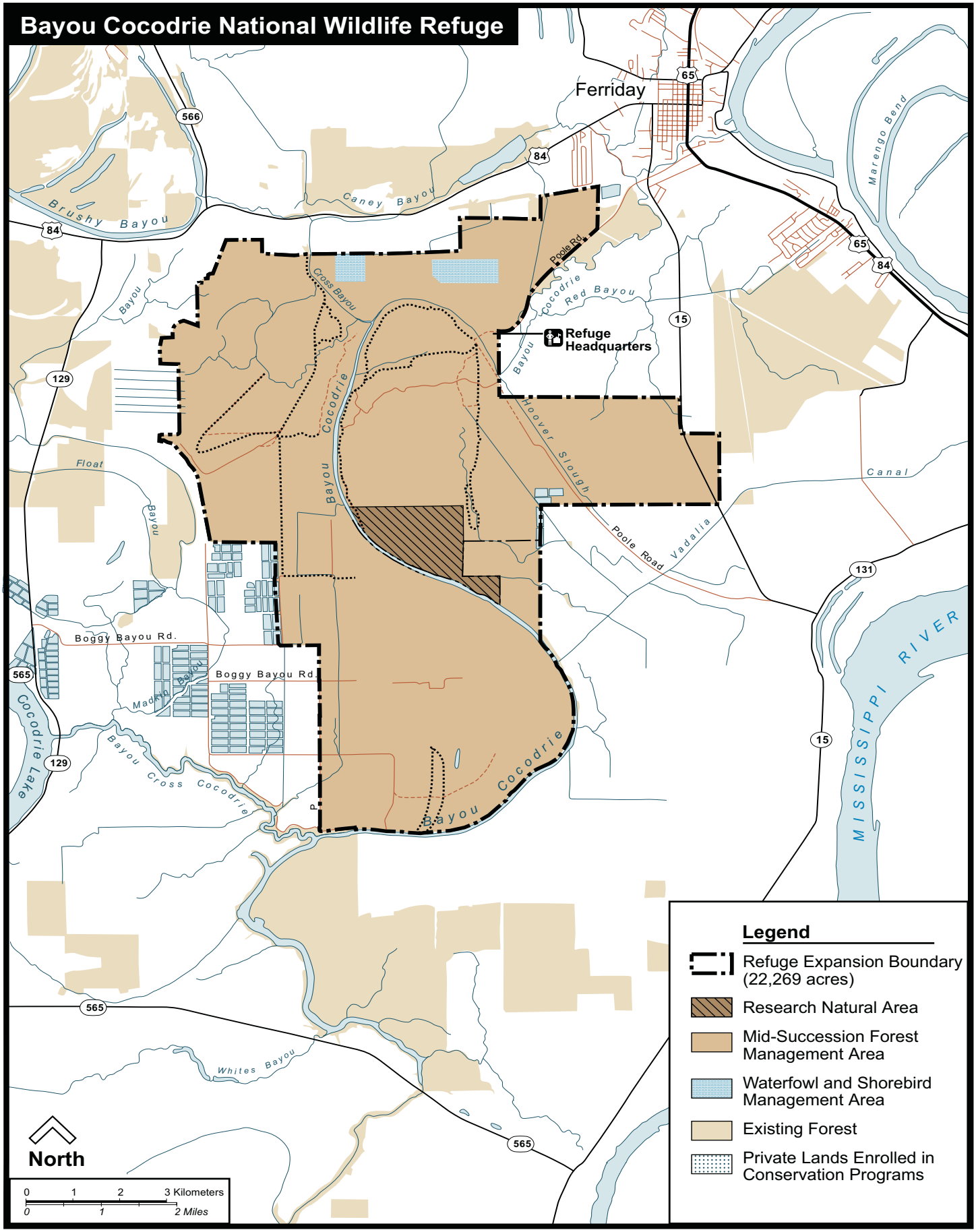
This alternative reflects actions that include supporting recovery efforts for the Louisiana black bear; reforesting lands; restoring wetlands; improving facilities; and acquiring lands from willing sellers within the acquisition boundary. Continued emphasis will be placed on managing quality hunting of white-tailed deer, waterfowl, and small game. Wildlife-dependent recreation and environmental education activities would continue to be encouraged where compatible and as biological staff can perform services as a collateral duty. The number of visitor facilities would remain the same. An inventory of plants and animals and monitoring of forest breeding birds would be limited due to lack of staff. The staff would encourage landowners within the acquisition boundary to participate in land conservation programs (Figure 6).

This alternative reflects a continuation of existing programs and activities through the year 2015 (Figure 19). High priority actions include protection and recovery of threatened and endangered species and wetland management directed towards waterfowl and associated species. Moderate emphasis would continue on managing other game species, with priority placed on recreational hunting. Biological diversity and ecosystem management would be a goal, but not a high priority. Prominent habitat practices would include water level management and moderate levels of forest management. Recreation and educational activities would be encouraged, where compatible, and the number of visitor services might increase slightly. Limited attention would be given to air and water quality.

Alternative B - Proposed Action

The primary focus under this alternative would be to add more staff, equipment, and facilities in order to manage and reforest greater areas in support of biological communities that utilize complex forest structures. The Service would manage water impoundments to increase waterfowl and shorebird migration habitat. The Service would pursue acquisition interests of up to 9,101 acres of in-holdings within the current refuge acquisition boundary, and up to 20,000 acres within the proposed expansion area. Recreation and education programs would be developed to support fishing, an enhanced hunting program, wildlife observation and photography, and environmental education and interpretation activities. Land protection priorities would focus on acquiring sufficient proprietary interests in properties to sustain endemic populations, including such species as the Cerulean warbler, swallow-tailed kite and Louisiana black bear (Figures 1 and 4).

Figure 19. Alternative A (No Action) Long-Term Projection



Enhancement and restoration of wildlife habitats and management of priority public uses to complement population and habitat management objectives are characteristic of Alternative B. This alternative represents the proposed management that would make significant progress toward achieving long-range goals and objectives and respond to the identified issues given current authorities, policies, and other management directives.

This alternative focuses on ecosystem management, a resolution of problems that affect the refuge and the Lower Mississippi Valley and providing wildlife-dependent recreation. Significantly greater attention would be devoted to the management of landbirds, including migratory songbirds; protection and recovery of the sub-population of Louisiana black bear; management and protection of unique old growth forests; and research and monitoring of biological communities. Six wildlife-dependent recreation and education uses would be developed to provide some opportunities to residents in Concordia Parish.

This alternative assesses the effects of management on private lands that may be enrolled in the Partners-for-Wildlife program. The Service would assume complete administrative and management responsibility for private properties enrolled in its conservation programs outright and shared responsibility for the properties that are maintained by the landowner. Once the refuge boundary is expanded, specific management actions would be identified in step-down management plans that identify measures and strategies to be taken for wildlife protection, including the allowance of certain visitor activities (Figures 10 and 11).

Major management activities that the Service would undertake include:
- Establishing and managing a wildlife and habitat inventory and monitoring program;
- Protecting, enhancing, and managing bottomland hardwood stand structure and conditions;
- Establishing and managing a Research Natural Area;
- Restoring forest habitats for specific migratory birds that utilize old growth forests;
- Establishing partnerships to conserve and restore wildlife travel corridors for Louisiana black bear movement between Red River Wildlife Management Area, Bayou Cocodrie National Wildlife Refuge, and Tensas River National Wildlife Refuge;
- Developing a comprehensive wildlife-dependent recreation and environmental education program;
- Hiring an interdisciplinary staff that would be fully responsive to supporting fish and wildlife needs;
- Improving facilities and infrastructure for maintenance, access, and visitor use;
- Purchasing strategic lands to reestablish and improve conditions for species that utilize old growth forests in the Lower Mississippi River;
- Participating with partners, including U.S. Department of Agriculture, to pursue private landowner enrollment in conservation programs.

Alternative C:

The primary focus under this alternative would be to add more staff, equipment, and facilities in order to manage and reforest greater areas in support of biological communities that utilize complex forest structures. The Service would pursue acquisition interests of up to 9,101 acres of in-holdings within the current refuge acquisition boundary and up to 28,000 acres within the proposed expansion area for an overall acquisition of up to 37,101 acres. Recreation and education programs would be developed

Swallow-tailed kite
L. Page Brown - Cornell Lab of Ornithology

to support fishing, an enhanced hunting program, wildlife observation and photography, and environmental education and interpretation activities. Land protection priorities would focus on acquiring sufficient proprietary interests in properties to sustain endemic populations, including priority bird species and the Louisiana black bear (Figures 4 and 5).

This alternative would emphasize passively managing all refuge forests and managing priority public uses to complement population and habitat objectives. Alternative C represents proposed management that would make progress towards achieving long-range goals and objectives with emphasis on restoring old growth forest. Passive management would perpetuate mid-succession forest structure for the 15-year planning period and beyond.

This alternative would reflect management actions that emphasize restoring and managing a contiguous bottomland hardwood forest that will eventually become true old growth forest. Up to 50,269 acres of refuge lands would be fully protected, maintained, and restored to sustain fish and wildlife diversity. Alternative C may limit active forest management practices that affect threatened and endangered species or human-caused influences that interfere with natural processes. In keeping with Service policy, wildfires would continue to be suppressed. This alternative represents management actions that would make significant progress towards achieving long-range goals and objectives, with emphasis on reestablishing specific species that utilize old growth forests.

Alternative C would build on proposals identified in Alternative B, but with an emphasis on management of biological diversity and ecosystem management to support forest dwelling communities. Management would focus on restoration and maintenance of natural biological communities and ecological processes of forests to benefit high priority species as well as developing an extensive land protection and reforestation effort. Significantly greater attention would be devoted to protection and recovery of the Louisiana black bear, land protection, and reforestation. As lands are acquired, the hunting program would be expanded. At times, some hunting and fishing for recreational and commercial purposes may be prohibited or restricted to the vicinity of administrative and interpretive sites to protect Louisiana black bear den areas and ground nesting migratory birds. Extensive monitoring and research would occur (Figures 20 and 21).

Comparison Of Alternatives

Each alternative is different in the type of land management and protection it would offer to achieve long-term wildlife and habitat goals and objectives. However, each is similar in its approach to managing the refuge.

Each alternative would acquire, protect, and enhance a diverse assemblage of bottomland hardwood habitat; and would be consistent with the following: Partners-in-Flight Plan; North American Waterfowl Management Plan; Lower Mississippi Valley Joint Venture; Louisiana Black Bear Protection Plan; Endangered Species Act; National Wildlife Refuge Improvement Act, Migratory Bird Conservation Act; and mission and goals of the National Wildlife Refuge System. Each alternative would be a cost-effective mechanism combining fee title ownership and partnering with private landowners, and providing management flexibility on properties purchased in fee title.

Figure 22 identifies and compares management actions as a means of responding to the problems and issues raised by Service managers and the public. These management actions were summarized into the three alternatives described above to accomplish the refuge system mission, the authorized purpose of the refuge, and to address significant threats, problems, and issues raised by public agencies and private citizens.

For further information regarding the rationale used to formulate objectives, please refer to Section A, Chapter IV.

Management Common To All Alternatives

Compatible Secondary Uses

The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, states that national wildlife refuges must be protected from incompatible or harmful human activities to ensure that Americans can enjoy refuge system lands and waters. Before activities or uses are allowed on a national wildlife refuge, the uses must be found to be compatible. A compatible use "...will not materially interfere with or detract from the fulfillment of the mission of the refuge system or the purposes of the refuge." "Wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety."

Habitat
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Figure 20. Alternative C Short-Term Projection

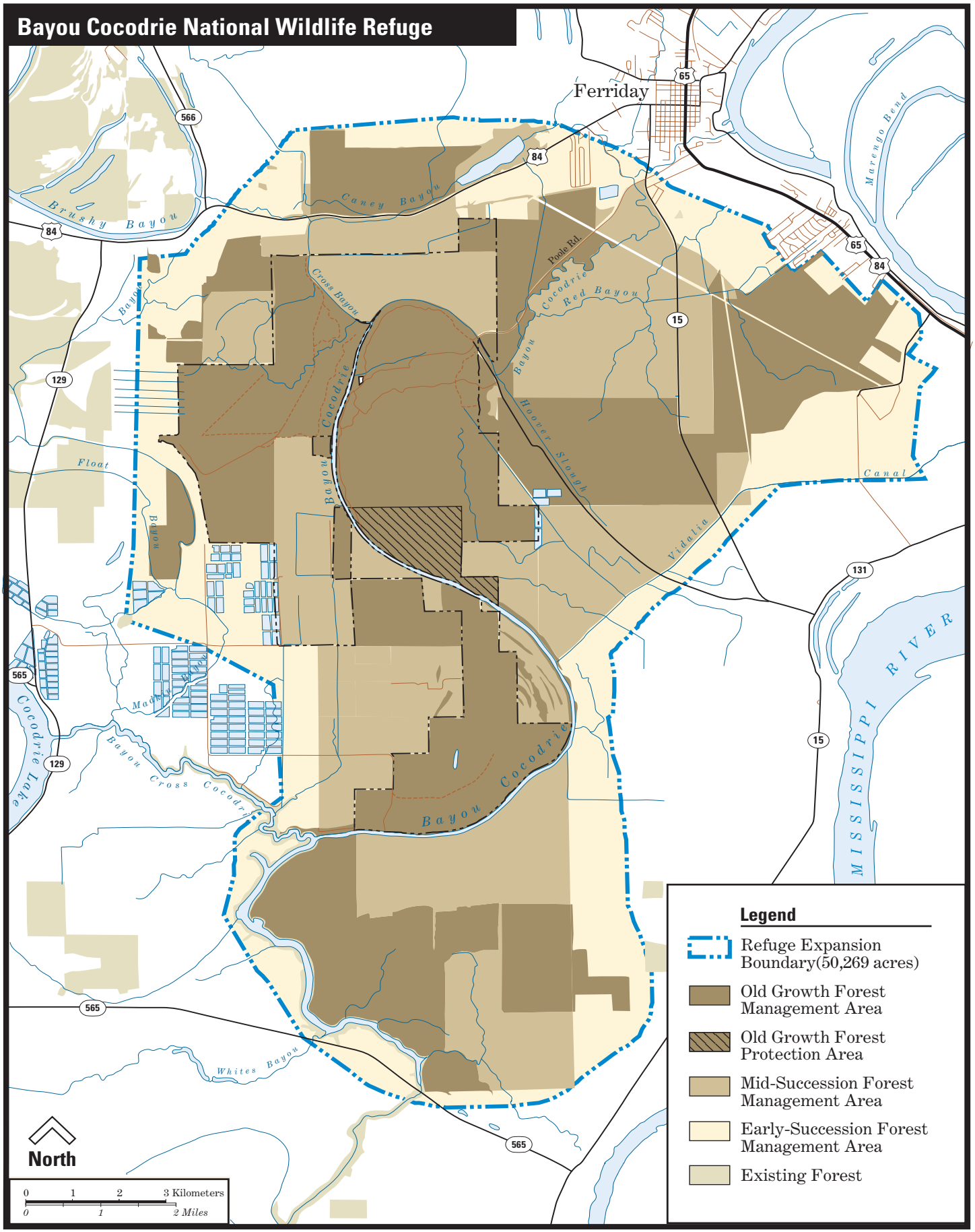
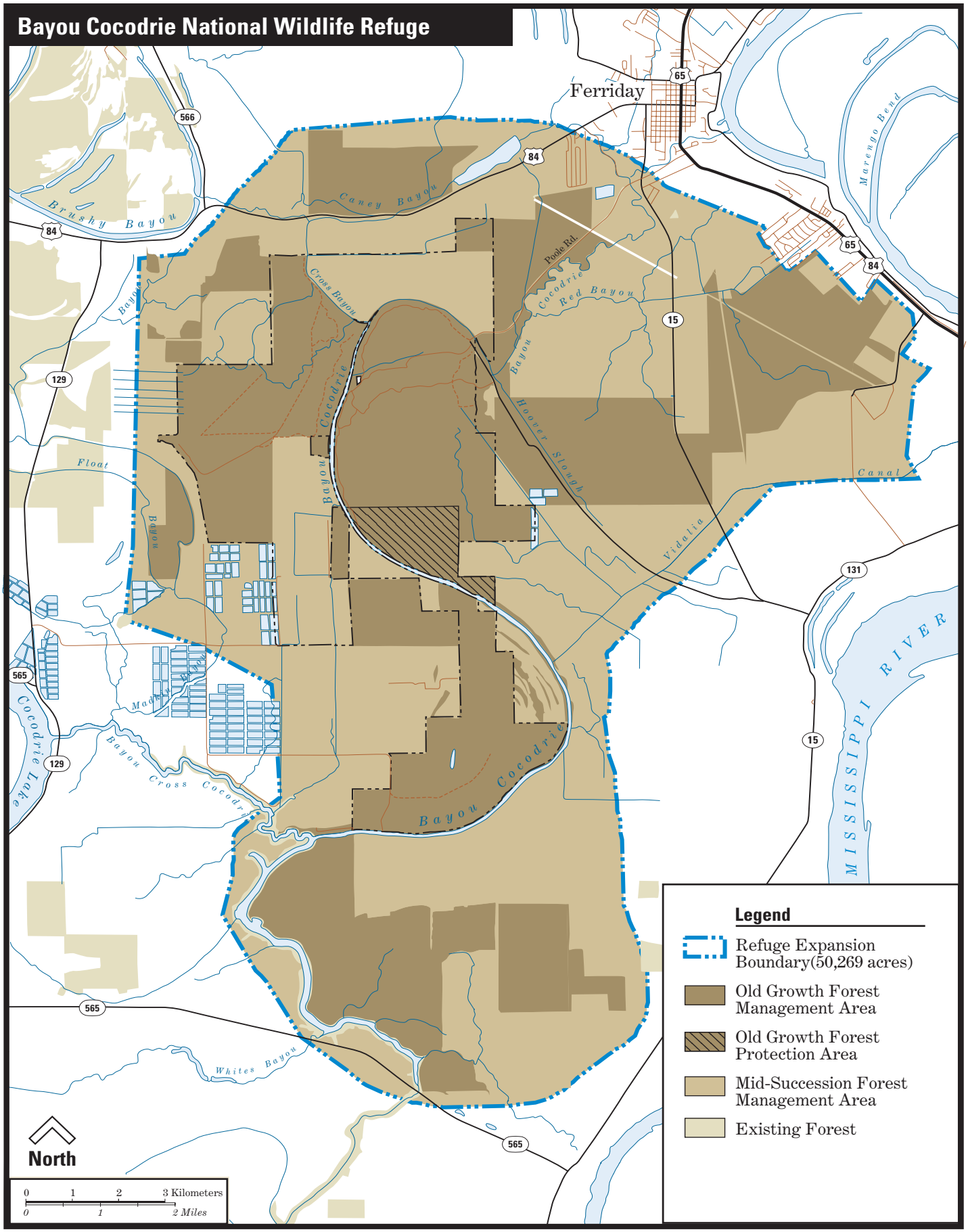


Figure 21. Alternative C Long Term Projection



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

Other Management

All management activities that could affect natural resources, including subsurface mineral reservations, utility lines and easements, soil, water, and air, and historical and archaeological resources will be managed to comply with all laws and regulations. The Service has a legal responsibility to consider the effects its actions have on cultural resources. Under all alternatives, the Service will manage these resources in accordance with public law and agency policy. Individual projects will require additional consultation with the Advisory Council on Historic Preservation, and the State of Louisiana Historic Preservation Office. Additional consultation, surveys, and clearance will be required where project development is conducted on the refuge or when activities will affect properties eligible for the National Register of Historic Places.

Special Management Areas

A 750-acre old growth tract in the Brooks Brake Management Unit would be managed as a Research Natural Area. Guidance for management would derive from the Fish and Wildlife Service Manual (Figure 22).

Land Acquisition

The acquisition of larger contiguous forest tracts adjacent to Service-owned lands within existing refuge acquisition boundaries would be given the highest priority. All land transactions are subject to contaminant surveys.

Funding for land acquisition would come from the Land and Water Conservation Fund and the Migratory Bird Conservation Fund. Conservation easements and leases can sometimes be used to obtain 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 and state agencies, and accept conservation easements. Some parcels within the proposed refuge boundary expansion may be owned by other public or private conservation organizations. The Service would work with interested agencies to identify additional areas needing protection and provide technical assistance if needed. The acquisition of private lands is entirely contingent on landowners and their willingness to participate (Appendix D).

Refuge Revenue Sharing

Annual payments to Concordia Parish would continue at similar rates under each alternative. If lands are acquired and added to the refuge, the payments would increase accordingly.

Education and Visitor Services Management

As the visitor service program is developed, the staff would continue to assess the program and its potential impact on refuge resources. Changes in the program would be implemented as needed to address any impacts identified and to respond to anticipated wildlife population increases. To assure a quality wildlife-dependent recreation experience while achieving the "wildlife first" mandate, the number of users and conflicts among users may be limited by the following: (1) permitting uses; (2) designating roads, trails, and sites for specific kinds of wildlife-dependent recreation use; and (3) permitting uses at certain times of the year.

If the Service develops a canoe launch or fishing pier on Bayou Cocodrie, it would seek the necessary permits as they apply to the State Scenic River designation. There are a number of situations where future refuge closures or restrictions on access may be warranted. Examples of these situations include, but are not limited to, the following: protection of endangered species; protection of nesting birds and bear den sites; management of a Research Natural Area; restriction of recreation activities to achieve specific wildlife population objectives; minimization of conflicts with other refuge management programs; and limitations from inadequate funds and/or staff to administer a use.

Refuge Administration

The maintenance and operation of refuge administrative facilities would continue, regardless of the alternative selected. Periodic updating of facilities is necessary for safety and accessibility and to support staff and management needs. Funding needs have been identified for several projects including providing additional facilities and equipment to support the existing staff.

Figure 22. Comparison of Alternatives

Fish and Wildlife Population

Goal A: Contribute to the wildlife population goals and objectives established in nationally and internationally significant management plans, including Partners-in-Flight Plan; Louisiana Black Bear Protection Plan; North American Waterfowl Management Plan; American Woodcock Management Plan, and other plans for the Lower Mississippi Valley.

Objective A.1: Songbirds

Alternative A *(No Action)*	Alternative B *(Proposed Action)*	Alternative C
Monitor current populations of migratory forest breeding birds within the existing old growth forest stand to determine nesting success.	Support healthy populations of forest-dwelling migratory songbirds, specifically 500 pairs of Swainson's warblers, and reestablish populations of Cerulean warblers and swallow-tailed kites.	Support healthy populations of forest-dwelling migratory birds, by maintaining a large block of old growth forest.
Strategies:		
Install prothonotary warbler and blue bird boxes in the Brooks Brake Unit. Develop an inventory and monitoring management plan. Initiate annual bird survey. Develop clear biological goals and objectives for management of resident wildlife and assure management reflects the contribution of these goals to native biological diversity.	Survey the refuge and determine baseline populations for forest-breeding non-game birds. Establish point count stations to determine population size changes over time. Conduct nest productivity studies, including predator disturbance during the nesting season, both in existing forests and in areas undergoing reforestation to determine actual population health for as many species as possible. If population objectives are not met, then reevaluate management actions and other possible causes and assess findings to determine appropriate corrective measures. Manage beaver, muskrat, raccoons, and feral hogs to protect and target forest breeding bird species, including the use of such techniques as trapping.	Same as Alternative B.

Objective A.2: Black Bear		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Assist in the recovery of the Louisiana sub-population of federally listed, threatened Louisiana black bear.	Assist in maintaining viable populations of those species of fish, wildlife, and plants endemic to bottomland hardwoods, including the federally listed threatened Louisiana black bear.	Manage to support on refuge lands, a viable population of the federally listed threatened Louisiana black bear.
Strategies:		
Participate in black bear studies and planning initiatives. Respond to local communities when bears are sited. Coordinate with the private conservation organizations to identify and acquire properties for black bear protection.	Coordinate with neighbors, the Black Bear Conservation Committee, Louisiana Department of Wildlife and Fisheries, and other agencies/organizations in Concordia Parish to facilitate bear conservation and research program. Conduct outreach efforts involving neighbors, local residents, schools, and businesses on bear biology and conservation and the effect bears will have on activities of neighboring landowners. Encourage refuge visitors, as well as surrounding landowners, to report bear sightings or suspected bear activity. Assist others with all phases of black bear management and nuisance control in Concordia Parish. Provide habitat that supports the recovery of the Louisiana black bear.	Same as Alternative B.

Objective A.3: Waterfowl and Shorebirds		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Provide habitat to support about 10,000 migrating waterfowl, 12,000 migrating shorebirds and other important associated migratory bird populations, including woodcock.	Same as Alternative A.	Manage forest habitats to support forest wetland bird species in conjunction with forest management directed towards migratory songbirds.
Strategies:		
Build and design impoundments to utilize the natural flow in the Brooks Brake Unit. Locate water impoundments away from neighboring catfish ponds. Install wood duck boxes where appropriate, and monitor annually.	Conduct shorebird and other waterbird counts using International Shorebird Survey protocol on 10-day intervals during migration and wintering periods. Assess food quality and quantity on the refuge during peak periods of shorebird movement. Assess food quality and quantity on and off the refuge during peak periods of waterfowl use. Develop impoundment units with a moist soil component to support waterfowl and shorebird use. Assess wintering and foraging habitat on and off refuge during peak periods of woodcock use.	Install wood duck boxes as needed and monitor annually. Assess wintering and foraging habitat on and off refuge during peak periods of woodcock use.

Objective A.4: Resident and Other Species		
Manage to maintain healthy, viable resident populations, including white-tailed deer and turkey.	Manage to maintain healthy, viable resident populations, including white-tailed deer (average harvest range 250-300 deer), turkey, and other resident species.	Same as Alternative B
Strategies:		
Monitor the population status of key indicator species, white-tailed deer and turkey. Manage white-tailed deer population at current levels (average harvest range is between 250-300/10,000 acres). Integrate population objectives for resident species into habitat management plans. Establish hunting regulations for resident wildlife to maintain population health and stability and habitat relationships. Coordinate with neighbors. Identify thresholds of disturbance and develop associated standards and mitigation techniques that can be applied, where appropriate, to reduce conflicts and achieve balance between the public and wildlife. Designate raccoons as an incidental take species. Prepare and conduct biological/ monitoring plan which includes establishing baseline information on reptile/amphibian occurrence and habitat utilization. Develop population estimates for American alligator and monitor their effects on other trust species.	Same as Alternative A.	Same as Alternative A.

Objective A. 5 Integrated Pest Management		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Use integrated pest management techniques to reduce water hyacinth and hydrilla infestations to levels that do not negatively affect trust resources.	Reduce and/or eliminate invasive, exotic, and pest plant and animal populations to minimize negative effects to native flora and fauna.	Same as Alternative B.
Strategies:		
Develop an Integrated Pest Management Plan that will address the control of species that pose a threat to rare species.	Inventory and map the distribution of invasive and exotic plant species, and develop an Integrated Pest Management Plan consistent with a Nuisance Animal Control Plan. Use integrated pest management techniques to reduce water hyacinth and hydrilla infestations to levels that do not negatively affect trust resources or impede recreational use of water bodies. Inventory feral hog numbers and monitor effects on natural habitats and crop depredations. Provide hunter take provisions for feral hogs by including them as a incidental take species during any established refuge hunt. Use refuge staff and contracted animal damage control experts to maintain feral hogs at acceptable population levels in closed areas and other parts of the refuge as needed. Coordinate with the Aquatic Plants Division of the Louisiana Department of Wildlife and Fisheries to implement control programs. Coordinate results of information concerning success/failure of control treatments within and outside the agency, especially in regard to hydrilla.	Same as Alternative B.

Habitat Management

Goal B: Conserve, manage, and restore the values and functions of the refuge's bottomland hardwoods to sustain the biological diversity characteristic of the ridge and swale topography of the Lower Mississippi Valley.

Objective B.1: Contiguous Forest

Alternative A *(No Action)*	Alternative B *(Proposed Action)*	Alternative C
Reforest and connect 1,500 acres of existing forest tracts to improve diversity for migratory birds and resident wildlife.	Assemble, at a minimum, a 20,000-acre-block of mixed-age bottomland hardwood forests for a diversity of species, with special emphasis on migratory breeding songbirds and the threatened Louisiana black bear.	Assemble, at a minimum, a 50,000-acre block of bottomland hardwood forests for a diversity of species, with special emphasis on interior forest-breeding songbirds and the threatened Louisiana black bear.
Strategies:		
From willing sellers, acquire inholdings identified for black bear protection. Coordinate with adjacent land-owners to develop conservation practices, including reforestation on adjacent properties.	Develop and implement a forest habitat management plan designed to maintain a diversity of forest cover types, tree species compositions, and tree age-class distributions. Restore hydrology where needed and where practical. Develop clear biological goals and objectives for management of resident wildlife and assure that management reflects the contribution of these goals to native biological diversity. Inventory and establish deer, raccoon, beaver and feral hog population parameters and baseline indices. Conduct monitoring surveys. Develop and maintain geographic information system databases to monitor forest stand management results. Limit access through measures such as gating roads and minimizing all-terrain vehicle trails. Incorporate timber management practices that enhance bear habitat such as protection of potential den trees, allowing light to penetrate the forest floor for soft mast production, and managing for hard mast trees. Incorporate the enhancement/widening of forest corridors that link forested tracks through incentive programs, easements and/or purchase. Minimize logging and construction activities during periods of bear denning.	Same as Alternative B.

Objective B.2: Old Growth Forest Protection		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Protect existing 750 acres of old growth forest from development and minimize human disturbances.	Protect the existing 750 acres of old growth forest to support interior forest breeding songbirds and manage as a Research Natural Area.	Same as Alternative B.
Strategies:		
Reforest all open areas within the refuge acquisition boundary. Seek partnerships with conservation organizations, private industry, etc., to reforest refuge properties.	Establish baseline monitoring. Propose designation of the 750 acres as a Research Natural Area. Develop a monitoring plan that will standardize data collection, analysis, and reporting. Monitor migratory breeding bird habitat conditions and manage for the priority species group identified for this refuge. Contact landowners about providing limited and/or seasonal public access to the site and, if possible, provide a gated and improved road over private lands to old growth site. Coordinate research efforts with scientists and research community. Prohibit logging in 750 acres designated as a Research Natural Area and manage partnerships to monitor migratory songbird populations. Restore hydrology where needed and where practical.	Same as Alternative B.

Objective B.3: Old Growth Forest Management		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Monitor existing forests in the Brooks Brake Unit.	Manage and enhance approximately 3,200 acres of the Brooks Brake Unit (outside the protected old growth area) to move toward old growth conditions for interior breeding forest songbird populations.	Assemble,at a minimum, 55,000 acres of contiguous forest.
Strategies:		
Develop a habitat restoration plan that will specify desirable stand conditions. Develop an integrated pest management plan. Manage old growth timber as a Research Natural Area. Manage to minimize exotic species.	Evaluate forest survey requirements needed to plan forest management on this unit. Develop a habitat restoration plan that will specify desirable stand conditions. Utilize habitat management techniques that will mimic old growth structure and function while allowing the forest to become self-sustaining old growth. Inventory and establish deer, raccoon, beaver, and feral hog population parameters and baseline indices. Conduct monitoring surveys. Develop and maintain a geographic information system. Limit access such as gating roads and minimizing vehicle/trail access. Incorporate timber management practices that enhance bear habitat such as protection of potential den trees, allowing light to penetrate forest floor for soft mast production, and managing for hard mast trees.	Same as Alternative B.

Objective B.4: Other Forest Management		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Protect existing forests in all management units to support resident species.	Manage, at a minimum, 10,000 acres of existing mid-succession forests in the Wallace Lake and Cross Bayou Management units to support migratory songbirds and resident species.	Manage, at a minimum, 30,000 acres of existing mid-succession forests to support migratory birds, black bear and resident species.
Strategies:		
Develop a forest habitat management plan that can be implemented by existing staff and through partnerships with others. Where appropriate, manage habitat functions and values to improve conditions altered by beaver activities within the Brooks Brake and Wallace Lake Units. Develop an Integrated Pest Management Plan.	Develop and implement forest and water management programs to provide needed nesting, foraging and resting habitat. Implement forest management approaches that result in the development and maintenance of understory, midstory, and overstory stand components (i.e., complex forest stand structure) to meet the needs of forest-dwelling, non-game birds. Where appropriate, manage habitat functions and values to improve conditions altered by beaver activities within the Brooks Brake and Wallace Lake Units. Develop a habitat management plan that will specify desirable future stand conditions. Evaluate forest survey requirements necessary to plan forest management on the refuge. Develop an Integrated Pest Management Plan.	Remove artificial dikes, drainage features, fences, and roads where appropriate. Partner with surrounding land managers and landowners to create wildlife corridors and buffer zones for refuge core old growth areas and promote restoration of openings and roads. Develop and implement forest and water management programs to provide needed nesting, foraging, and resting habitat. Develop a habitat management plan that will specify desirable future stand conditions. Evaluate forest survey requirements necessary to plan forest management on the refuge. Develop an Integrated Pest Management Plan.

Objective B.5: Reforestation		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Reforest all refuge lands (currently 3500 acres) as they are acquired.	Reforest, at a minimum, 7,000 acres of open areas and manage to achieve structurally complex mid-succession forest conditions and decrease effects of fragmentation.	Reforest, at a minimum, 10,000 acres of open areas and manage to achieve structurally complex mid-succession forest conditions and decrease fragmentation.
Strategies:		
Reforest all refuge lands except those areas identified for waterfowl management, using appropriate species to the site. Utilize forest management techniques to establish disturbance to maintain vertical and horizontal complexity. Seek funding opportunities and partners to assist in reforesting refuge lands. Utilize partnerships with private industry and others, public agencies, and conservation organizations to reforest open areas.	Reforest all refuge lands except those areas identified for waterfowl management, using appropriate species to the site. Develop and utilize forest management techniques to establish disturbance and maintain vertical and horizontal complexity. Seek funding opportunities and partners to assist in reforesting refuge lands.	Seek funding opportunities and partners to assist in reforesting refuge lands. Utilize partnerships with private industry and others, public agencies, and conservation organizations to reforest open areas.

Objective B.6: Wetlands		
Restore and enhance 440 acres of seasonal wetlands to provide high-quality migration and foraging habitat for waterfowl.	Restore and enhance 440 acres of seasonal wetlands to provide high-quality migration and foraging habitat for waterfowl and shorebirds.	No management of wetlands for waterfowl and shorebirds.
Strategies:		
Manage impoundments for waterfowl. Develop a Moist Soils Management Plan.	Manage existing impoundments for waterfowl and shorebirds. Monitor waterfowl utilization patterns and waterfowl populations. Develop and implement a Moist Soils Management Plan.	Monitor waterfowl and other bird utilization patterns and populations in seasonal wetlands in the Brooks Brake Unit.

Education and Visitor Services

Goal C: Develop a balanced wildlife-dependent recreation program that will benefit refuge visitors and be consistent with the Refuge System Improvement Act of 1997.

Objective C.1: Hunting

Alternative A *(No Action)*	Alternative B *(Proposed Action)*	Alternative C
Manage existing harvest level of population 250-300 white-tailed deer per 10,000 acres on refuge lands to support wildlife and habitat objectives.	Where appropriate, increase white-tailed deer hunting opportunities and manage deer populations at or slightly below carrying capacity and provide small game and waterfowl hunting opportunities.	Same as Alternative B.
Strategies:		
Evaluate potential impacts of hunting on other refuge activities and programs. Manage hunt program to achieve population management and wildlife habitat objectives. Develop limited season modern gun hunt as staff can be available to administer hunt.	Monitor deer populations via browse surveys, harvest data, and periodic health checks. Manage hunt program to achieve population management and wildlife habitat objectives. Increase hunting area to include reforested habitat for small game and big game hunting as lands are acquired and managers are available to manage additional hunters. Expand hunting program to include a quota modern gun hunt for white-tailed deer, and to provide waterfowl hunting opportunities. Improve refuge access by extending trails and providing additional entry/check points. Revise 1994 Refuge Hunt Plan in coordination with Louisiana Department of Wildlife and Fisheries to assist in achieving balanced and healthy game populations. Evaluate potential impacts of hunting on other refuge activities and programs. As forest lands are acquired, develop parking and trail access for archery, gun, and muzzle loader hunting.	Same as Alternative B.

Objective C.2: Fishing		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Evaluate and develop sport fishing access on Bayou Cocodrie (mainstream).	Improve areas for limited parking, canoe/small skiff launching, and for bank fishing at two existing locations near Bayou Cocodrie.	Same as Alternative B.
Strategies:		
Develop a sport fisheries management plan. On a permit basis allow fishing access on Bayou Cocodrie. Seek the necessary permits with the State of Louisiana to provide canoe access at the Cross Bayou in the Brooks Brake Unit.	Inventory and evaluate fishery resource potential using Service's Fisheries Division. In consultation with county, state, and federal partners, develop and implement a Sport Fishing Management Plan to provide a quality fishing experience. Evaluate the costs, logistics, and safety considerations in creating suitable sites for fishing. Coordinate development of parking facility, structures, and activities with the Louisiana Department of Wildlife and Fisheries and other appropriate entities (permits regarding Scenic River status). Develop bank fishing access on existing properties including Bayou Cocodrie, Cross Bayou, and Wallace Lake.	Same as Alternative B.

Objective C.3: Wildlife Observation and Photography		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Provide safe access in the Brooks Brake Unit for wildlife observation and photography.	Improve access and opportunities for wildlife observation and photography region-wide with emphasis on improvements in the Brooks Brake Unit.	Same as Alternative B.
Strategies:		
Clear and maintain seasonal trails for bird watching.	Develop an Education and Visitor Service Management Plan.	Same as Alternative B.
Conduct annual tours to the old growth area.	Evaluate the potential for and the impacts of siting a trail head for canoe access from the Books Brake Unit.	
	Develop canoe access areas, trail head parking, and foot trail to old growth area along with interpretive panels for wildlife viewing and photography.	
	Develop a boardwalk trail loop and parking area near the refuge headquarters. Design interpretive panels and accessible trails.	
	Maintain a seasonal trail to Wallace Lake.	
	Where appropriate, develop wildlife viewing sites.	
	Encourage the development of volunteer services to support recreational programs.	
	Monitor and survey recreational programs.	
	Develop a wildlife tour with interpretive panels designed to highlight refuge management and unique features of the refuge.	

Objective C.4: Environmental Education		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Provide limited environmental education to local civic groups, schools, and area organizations.	Initiate and develop a community based environmental education program with area schools and local conservation groups to increase awareness of the refuge and management activities.	Same as Alternative B.
Strategies:		
Increase local awareness of the refuge. As requested, on an informal basis, participate in discussions and inform local constituencies about refuge activities and Service initiatives. Periodically update local public (e.g. Police Jury, School Board, Chamber of Commerce) on refuge activities.	Develop a volunteer based Instructor Corps Program to provide manpower for environmental education and interpretive programs, and facilities development. Develop teaching materials and host annual teacher workshops to promote environmental education based curriculum in local schools. Encourage the development of a refuge friends group as well as a volunteer program to support environmental education programs. Monitor and survey recreation and education uses throughout the refuge as an ongoing program. Develop a visitor education center on Poole Road and develop an outdoor classroom. Increase involvement and update local public (e.g., Police Jury, School Board, Chamber of Commerce) on refuge activities.	Same as Alternative B.

Objective C.5: Interpretation		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
On a periodic basis, manage interpretation that will respond to current management activities on the refuge.	Develop an interpretive program that will increase awareness of the refuge and its unique features and values, as well as wildlife associated with bottomland hardwood forest communities.	Same as Alternative B.
Strategies:		
Distribute outreach materials to appropriate landowners and local schools.	Coordinate with staff of St. Catherine Creek National Wildlife Refuge to develop an interpretive display at the Louisiana Hydroelectric Visitor Center. Develop a series of interpretive programs and events that incorporate management and research activities. Programs and events will be staged so as not to disrupt nesting birds or when research activities could be disrupted by human disturbance. Increase local awareness of the Lower Mississippi River Ecosystem and the importance of bottomland hardwood forests. Offer educational classes on wildlife observation opportunities and unique features of the refuge to local community and events coordinators. Promote ecotourism opportunities in conjunction with local partnerships, businesses and civic groups. Such opportunities may include birding tours, festivals, and other special events. In conjunction with St. Catherine Creek National Wildlife Refuge, promote opportunities and partnerships with local civic groups such as the Natchez Visitor Center. Develop an exhibit for the Natchez Visitor Center featuring both Bayou Cocodrie and St. Catherine Creek National Wildlife Refuges.	Same as Alternative B.
Objective C.6: Recreation Facilities		
Manage facilities that promote hunting and wildlife observation and photography.	Develop and improve existing visitor facilities throughout the refuge that promote year-round wildlife-dependent recreation, education, interpretation, and viewing opportunities.	Same as Alternative B.
Strategies:		
Maintain existing trails, trailheads, and hunter check stations for hunting season.	Prepare an Education and Visitor Services' Management Plan. Develop and implement a Sign Plan. Develop gated parking facilities with interpretation/information signs. Maintain the existing Wallace Lake trail for foot access. Develop a headquarters/visitor center facility. Develop a refuge friends/support group. Institute a refuge volunteer program.	Same as Alternative B.

Refuge Administration

Goal D: Develop and implement a comprehensive refuge facility program responsive to management and fish and wildlife needs.

Objective D.1: Staff and New Facilities

Alternative A *(No Action)*	Alternative B *(Proposed Action)*	Alternative C
Manage current staff and maintain facilities to support refuge management programs.	Add six additional staff positions, develop new facilities and improve existing facilities to support a comprehensive refuge management program.	Add nine additional staff, improve existing facilities, and develop new facilities to support a comprehensive conservation refuge management program.
Strategies:		
Maintain refuge office and maintenance facilities to comply with safety standards.	Expand refuge office and maintenance facilities near the present facilities, off of Poole Road, to support biological program objectives and comply with safety standards. Increase professional staff positions to include a law enforcement officer, forester, forestry technician, biologist, biology technician, and outdoor recreation planner. Increase refuge funding to support addition of operations and maintenance activities, including the purchase of computer equipment and software, inventory and monitoring equipment (Geographic Information System), and heavy equipment. Promote partnerships and seek challenge cost share grants for construction of recreation facilities. Develop secured storage for petroleum and chemical products. Develop a radio communication system responsive to law enforcement and other field operations.	Same as Alternative B, except increase professional staff positions to include all positions indicated in Alternative B plus an additional forester or forest ecologist, and two biologists.

Objective D.2: Operations and Maintenance

Manage current staff and maintain facilities to support refuge management programs.	Improve current operations and maintenance capability to support long-term wildlife, habitat, and visitor services objectives.	Same as Alternative B.
Strategies:		
Maintain refuge office and maintenance facilities to comply with safety standards.	Seek support of parish and state transportation officials to fund, develop, and maintain Poole Road, the entrance to refuge visitor service facilities, and other roads used for refuge access. Add additional equipment to support habitat and wildlife management activities. Promote partnerships and seek challenge cost share grants and other funding sources for maintenance of recreation facilities.	Same as Alternative B.

Archaeological and Historic Resources

Goal E: Protect refuge cultural resources in accordance with federal and state historic preservation legislation and regulations.

Objective E.1: Survey/Investigation

Alternative A *(No Action)*	Alternative B *(Proposed Action)*	Alternative C
Protect archeological sites and historic structures from refuge management activities.	By 2005, conduct a refuge-wide archaeological survey.	Same as Alternative B
Strategies:		
	Secure funding to conduct a comprehensive archaeological survey and geomorphic investigation. Develop databases for the refuge's archaeological and historic sites. Procure pertinent scientific reports and articles and produce an annotated bibliography to document the region's history, geomorphology, and the utility of the scientific methodology.	Same as Alternative B.

Objective E.2: Archaeological and Historic Resources Protection

Protect the refuge's cultural resources and to diminish site destruction due to looting and vandalism.	Develop and implement law enforcement procedures to protect the refuge's cultural resources and to diminish site destruction due to looting and vandalism.	Same as Alternative B.
Strategies:		
Pertinent staff and law enforcement officers will attend Archaeological Resource Protection Act training course and Section 106/Cultural Resources for Managers course.	Same as Alternative A.	Same as Alternative A.

Objective E.3: Cooperative Management

Coordinate with others to manage cultural resources.	Assist in organizing partnerships to manage cultural resources with pertinent federal and state agencies consistent with the Louisiana Comprehensive Archaeological Plan (1983).	Same as Alternative B.
Strategies:		
Coordinate with the La. State Historic Preservation Office on the development of new facilities.	Coordinate agreements with appropriate agencies to enhance law enforcement and facilitate investigations in keeping with the Archaeological Resources Protection Act. If appropriate, coordinate with Louisiana State University or other entities for the permanent curation of archaeological collections and associated documentation.	Same as Alternative B.

Objective E.4: Visitor Awareness		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Assist in distributing educational materials that provide an understanding and appreciation of the refuge's ecology and the human influence on ecosystems of the Lower Mississippi Valley.	Develop and implement an educational program that will provide an understanding and appreciation of the refuge's ecology and the human influence on ecosystems of the Lower Mississippi Valley.	Same as Alternative B
Strategies:		
None	Work with local Native American and African American communities to develop an education program.	Same as Alternative B.

Land Protection and Conservation

Goal F: Protect and improve conditions for biological and other natural resource values through the use of current land protection programs.

Objective F.1: Land Acquisition		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Seek to acquire about 10,000 acres of inholdings as defined within current land protection plans.	Seek to acquire approximately 20,000 acres of private land tracts to achieve the forest habitat requirements in support of species including Swainson's warbler, swallow-tailed kite, Louisiana black bear, and white-tailed deer.	Seek to acquire approximately 28,000 acres of private land tracts to achieve the forest habitat requirements in support of species including Cerulean warbler, swallow-tailed kite, Swainson's warbler, Louisiana black bear and resident species.
Strategies:		
Establish acquisition priorities based upon habitat values, overall and/or possible threats to existing resources, and contributions to ecosystem function. Seek partnerships with conservation organizations and others to complete acquisitions.	Achieve protection and conservation through a combination of lands within the current refuge acquisition boundary and lands within the proposed expansion areas. Ensure that lands are purchased or cooperatively protected based on the greatest habitat value to species life cycle needs and ecosystem representation. Establish acquisition priorities based upon habitat values and/or possible threats to existing resources. Initiate and continue contact with all landowners within the expanded acquisition boundary to determine landowner interest and participation. Develop a coordinated approach with partners to appropriately locate areas of greatest conservation concern. Seek partnerships with conservation organizations and others to complete acquisitions.	Same as Alternative B.

Objective F.2: Private Lands Technical Assistance		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Provide biological assistance and encourage partnerships with landowners to achieve wildlife population and habitat objectives.	Provide technical assistance and, when appropriate, utilize private lands conservation programs to develop partnerships with landowners to achieve wildlife and habitat objectives.	Same as Alternative B.
Strategies:		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Coordinate land conservation activities with private, local, state and federal organizations that participate in conservation incentive programs for local landowners. Develop and employ outreach strategies to encourage private landowners to participate in conservation programs.	Coordinate land conservation activities with private, local, state, and federal organizations that participate in conservation incentive programs for local landowners. Conduct an annual seminar for local land managers (private and public) on habitat management, current research and monitoring, and watershed issues. Develop and distribute a newsletter describing conservation programs that are available to private landowners. Communicate with adjacent and key landowners and other community organizations and participate in local Chamber of Commerce to promote outreach and cooperation in the management of the refuge. Develop and employ outreach strategies to enroll private landowners in the most appropriate conservation program. Where appropriate, protect the remaining private lands within the refuge acquisition boundary. Initiate and continue contact with all landowners within the existing acquisition boundary to determine the status of willing sellers. Establish acquisition priorities based upon habitat values and/or possible threats to existing resources. Seek partnerships with conservation organizations and others to complete acquisitions.	Same as Alternative B.

Objective F.3: Private Lands Enrollment in Conservation Programs		
Alternative A *(No Action)*	**Alternative B** *(Proposed Action)*	**Alternative C**
Seek to enroll 5,000 acres of high priority habitat in private lands conservation programs as identified in the Black Bear Protection Plan.	Seek to enroll 12,000 acres of high priority habitat in private lands conservation programs to establish migration corridors between the Three Rivers/Red River Wildlife Management Areas and the proposed Glade Woods National Wildlife Refuge.	Seek to enroll 6,000 acres of high priority habitat to establish migration corridors between the Three Rivers/ Red River Wildlife Management Areas and the proposed Glade Woods National Wildlife Refuge.
Strategies:		
Coordinate Louisiana black bear recovery activities with local landowners and Black Bear Conservation Committee. Identify and prioritize potential private lands conservation programs, such as conservation easements managed by the Service. Enroll private lands in incentive programs.	Coordinate Louisiana black bear recovery activities with other Service offices, state agencies, Black Bear Conservation Committee, and local landowners. In conjunction with state and federal agencies, develop and implement education programs within local communities. Develop land protection priorities and inform landowners of available private lands conservation programs. Identify and prioritize potential private lands conservation programs such as conservation easements managed by the Service. Enroll private lands in incentive programs.	Same as Alternative B.

Figure 23. Estimated Refuge Administration Costs

Estimated Refuge Budget	Alternative A No Action	Alternative B Preferred Action	Alternative C
Annual Staffing (reocurring costs)	7 Staff Positions **$316,000**	11 Staff Positions **$630,000**	12 Staff Positions **$700,000**
One Time Fleet	0	4 (vehicles and ATV)	Same as Alternative B
Heavy Equipment	0	5 (Grader, mower, tractors)	
New Facilities	0	3 (Visitor Center/ Headquaters, gravel road, and pave entrance road)	
		$3,688,000	**$3,688,000**

III. Affected Environment

Reference

Background information, as well as a description of the environment affected by the proposed management actions and activities is described in Section A.

IV. Environmental Consequences

Overview

Outlined are the predicted impacts that could result from the implementation of proposed actions described in Alternatives A, B, and C. Each alternative portrays expected outcomes for fish and wildlife species through the year 2015, varying in magnitude to the amount of land proposed to be acquired and the intensity of management. Proposed management actions described in Alternative A, such as acquisition of in-holdings and reforestation, would have minimal to no negative effect on the environment. Proposed management actions described in Alternatives B and C, such as expanding the refuge boundary, acquiring private property from willing sellers, and restoring all forests to varying degrees, would have minimal short-term negative effects and no long-term negative effects on the environment. Implementation of Alternatives B and C could influence agricultural production, related employment and income, and outdoor recreation and environmental education opportunities.

Effects Common To All Alternatives

This section assesses the environmental impacts of implementing the comprehensive conservation plan on the biological, physical, social, economical, cultural, and historical resources of the refuge. Most of the predicted impacts are common to all alternatives. A brief discussion of these impacts is outlined in the following paragraphs.

Fish, Wildlife, and Habitat

Each alternative would protect habitat types important to migratory birds, mammals, reptiles, amphibians, fish, and invertebrates including threatened and endangered species. All alternatives would provide equal protection of the existing old growth habitat. Alternative A would manage to maintain the least amount of old growth, while Alternatives B and C would manage to expand conditions for the most old growth. Alternative A would provide the least amount of habitat protection and management emphasis for migratory birds and populations of Louisiana black bear, while Alternatives B and C would provide the most protection and management. Implementation of all alternatives would benefit and not likely adversely affect endangered or threatened species or habitats.

Refuge waterfowl and shorebirds may be impacted by the proposed auto tour route discussed in Alternatives A and B. The auto tour traffic could negatively affect waterfowl and foraging shorebirds where the road parallels the impoundment. However, overall foraging habitat for waterfowl and shorebirds should improve under Alternatives A and B, because of the improved aquatic habitats and managed water impoundments proposed under these alternatives. Wood duck and woodcock populations would increase under all alternatives.

Bayou Cocodrie National Wildlife Refuge is part of the Cerulean warbler's former range. This species, now rarely seen, was once present in the area that is now the refuge. Cerulean warbler populations occur more frequently in large forest patches (>20,000 acres) consisting of old growth forests with complex canopy structure, typically choosing stands with the largest trees for nesting (Hunter 1999). Swallow-tailed kites nest in

similar habitat. Except for the old growth area located in the southern reach of the Brooks Brake Unit, the remaining old growth forests have been degraded due to years of timber harvest. High levels of crown closure interspersed with large, emergent trees are positively correlated with nest site location and success of these birds. Forest management activities outlined in Alternative B would result in long-term benefits that improve nesting habitat for these species.

Reforesting areas proposed in all alternatives would help to decrease the number of nest predators impacting forest breeding birds, and thus improve nesting success.

Each alternative would protect sites important to forest interior breeding birds and the populations of Louisiana black bear. Alternative A would provide the least protection, while Alternatives B and C have the potential to provide the most protection.

Occasionally, a transient black bear or bear footprints are cited on or near the refuge. Common disturbance impacts to black bear include traffic from roads, paths, and trails; farm and timber management activities; hunting; and residential development. These impacts would be greater under Alternative A, due to fragmented land ownership and lack of Service management capability. Alternatives B and C propose the expansion of hunting opportunities and recreational facilities resulting in more visitors to the refuge. Trail density and human disturbances from recreation would remain relatively low, but may negatively affect black bear reintroduction efforts. Temporary closures to public access may be necessary in some management units in order to mitigate impacts to threatened, endangered, and rare species, including populations of the Louisiana black bear (e.g., den in late successional stands).

Although there are no known nesting areas on the refuge, eagles have been sighted. Bald eagles are vulnerable to human disturbance around nesting areas and intolerant of human disturbance during the breeding season. A golden eagle was spotted by the staff in 1999, but was found dead of an apparent gunshot wound shortly after it was sighted. Swallow-tailed kites have been sighted around aquatic habitats near the refuge. Recreation activities including hiking, hunting, and the use of all-terrain vehicles and small fishing craft can be a major disturbance to these species. The level of recreation use is least disturbing to wildlife under Alternative A, and most disturbing under Alternatives B and C. The level of recreation use expected under Alternatives B and C include disturbances related to hiking, hunting, and fishing and could preclude the possibility of eagle nesting in parts of the Brooks Brake Unit, where most of the proposed recreation activities would occur. Hunting is primarily a winter season activity. Over the long term, Alternatives B and C would produce a number of suitable nests and roost trees for bald eagles. Alternatives B and C, over the long term, would produce suitable nesting and roosting habitat for the swallow-tailed kite.

The Rafinesque's big-eared bat, a species of management concern, is associated with late successional forests for roosting and has been cited in the old growth area of the Brooks Brake Unit. This species mainly relies on tall trees for roosts and commonly feeds on flying insects along forest edges, bayous, roads, and open swamps within the forest. Alternatives B and C would positively benefit this species, due to management of mature and old growth characteristics in forest habitats. Alternative A would have no effect on this species.

Old growth forests are extremely rare in the Lower Mississippi Valley. Under all alternatives, the refuge would fully protect existing old growth from timber harvest and would pursue the designation of a Research Natural Area at the location of the existing 750-acre old growth stand.

The deer population on the refuge is currently at a healthy carrying capacity. Under all alternatives, forest management actions could increase the deer population. Refuge forests and adjacent croplands provide rich sources of forage for deer. As the deer population increases, over-browsing of woody understory could occur, decreasing an important habitat for ground nesting birds.

Deer are impacted by human disturbance. Increases in the presence of people during the winter months and hunting season can cause an increased impact. However, without the use of hunting as a management tool, increased deer browsing would greatly impact area sensitive forest birds. Over the long term, Alternatives A and B would provide for management of mid- and late-successional forests likely increasing the number of deer which use these forests for cover and winter browse. All the alternatives include deer population control through a hunt program.

An integrated pest management plan would be developed under all alternatives. Alternative A would provide the least management, while Alternatives B and C would provide the most management. Whenever possible, all alternatives would use techniques other than pesticides to control these species. However, some quantity of pesticides would be used on a periodic basis.

Each alternative describes actions that address conversion of agricultural lands to bottomland hardwood forests and wetlands. All alternatives would provide additional protection to wetlands beyond the protection afforded by existing wetland regulations. Alternatives B and C would also protect landscape characteristics such as habitat connectivity and provide sufficient proprietary interest in properties to restore habitats for forest interior breeding birds. Alternative A would provide the least protection, while Alternatives B and C both have the potential to provide the most protection. Aquatic habitats, including commercial catfish ponds, are unlikely to be impacted from management of impoundments in the Brooks Brake Unit.

Under all alternatives, riparian areas along the Bayou Cocodrie River would be protected and reforested to create travel corridors between the refuge and public lands to the north and south. Subject to landowner control, wildlife corridors would be restored by private landowners who enroll their lands in private land conservation programs. Travel habitats and early- and mid-successional stands would be utilized by a variety of species, including black bear and white-tailed deer, thus positively benefitting these species.

A Research Natural Area would be managed on the south end of the Brooks Brake Unit according to Service policy. Access would be allowed on a permit basis to ensure that there would be no negative impact to the resources within the area.

All of the alternatives address regional climate change and biodiversity through reforestation. Each would impact the micro-climatic conditions within the existing refuge boundary as well as the proposed expansion area and immediate surroundings. Alternative A would provide the least biomass protection and Alternatives B and C would provide the greatest to offset harmful effects of carbon dioxide released into the atmosphere.

Because of extensive reforestation and subsequent increases in biomass and decreases in agricultural activities, air quality should improve from current levels under all alternatives.

All alternatives would positively impact soil formation processes on lands the refuge acquires. Some disturbances to surface soils and topography would occur at those locations selected for administrative, maintenance, and visitor facilities, as well as in areas targeted for forest management practices.

Each alternative would protect the natural hydrology of the affected areas. Alternative A would provide the least protection, while Alternatives B and C would provide the most protection. Each alternative would prevent substantial agricultural acreage from being developed if the Service acquired properties or provided assistance to landowners and local conservation partners. Each alternative describes conservation management that would maintain groundwater recharge areas, and maintain natural catchments to hold and absorb surface waters, thereby minimizing flooding.

All alternatives would positively impact the water quality in individual streams. Other positive impacts would result from the protection of groundwater recharge areas, runoff prevention, sediment retention, and minimizing non-point source pollution.

Each alternative would protect the aesthetic characteristics associated with bottomland hardwood forests.

Under all alternatives, the level of recreation use and ground based disturbance from pedestrians would be largely concentrated to the boardwalks, trails, refuge office, and maintenance area. This, combined with dispersed activities such as hunting, should not have a negative impact on nesting bird populations. It is unlikely that bald eagles would establish nests near developed facilities.

Under Alternatives B and C, hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation opportunities would increase as lands are acquired. Under each alternative, most of the newly acquired lands would be opened for public hunting. Alternatives B and C would also stimulate eco-tourism, potentially increasing tourism expenditures.

The number of hunting days as well as hunters may vary depending upon deer populations. High deer numbers are recognized as a problem causing extensive habitat and crop damage, therefore, an expanded deer hunt program is highly probable.

The refuge would control access under all alternatives. Alternatives B and C would restrict or limit access periodically in the Research Natural Area. Access would increase where boardwalks and the waterfowl viewing platform would be developed.

Visitor use management on refuges concentrates on the experience, not on the number of visitors. The type and intensity of visitor activities would vary from tract-to-tract depending on its size, habitat type(s), and wildlife uses. Because most of the land in Concordia Parish is currently in private ownership, the general public realizes only minimal access privileges. As the Service acquires more land and places it in the public trust, more opportunities for access would become available.

Under all alternatives hunting opportunities would expand. A gun hunt for deer and a limited waterfowl hunt would commence in 2001 under current management. Deer populations could be higher and more bucks present due to restoration and enhancement activities on the refuge under all alternatives. Depending on population levels, turkey hunts may be initiated.

Wildlife-dependent recreation described under Alternatives B and C support an increase in economic activity. There was a total of 5,000 visits reported in 1999. Economic benefits from the increased visitation should directly improve the value of goods and services to local communities such as Ferriday. With the exception of the compound area, the refuge is open year-round but difficult to access because of local flooding and lack of infrastructure. Portions may be closed occasionally because of the sensitivity of the habitat and its importance to black bear dens. Educational tours, however, would be conducted following the nesting season. Some special permits would be issued to conservation groups to conduct wildlife monitoring.

Under all alternatives, refuge visitation to support priority public uses would generally build over time as lands are acquired and operation funds are provided. Initially, much of the refuge usage is expected from local, parish, and state residents, although an increase in the number of spring and fall tourists is predicted for bird watching tours. The number of visitors would depend on the season and would grow as the land base increased and more public use programs were provided.

Many of the wildlife-dependent recreational activities offered have yet to be discovered by local citizens. As a generator of economic benefit, each alternative identifies hunting, birding, and wildlife observation as important tourist attractions.

Each alternative would decrease gross property tax revenues, however, there would be an increase in refuge revenue sharing payments. The Refuge Revenue Sharing Act requires the Fish and Wildlife Service to make payments to local taxing authorities to offset the loss in tax revenue when land is purchased for a refuge. Revenue sharing payments are based on selecting the highest payment calculated by one of three formulas. In 1999, Concordia Parish received $49,813.

Recent trends demonstrate a decline in federal farm subsidies for crop production (USDA Economic Research Service, 2000). Crop prices nationwide have declined as well. As a result, real estate trends demonstrate a marked increase in farm land sales. Wild lands have been declining nationwide. There is a positive benefit (including tax relief to heirs) for farmers in the Lower Mississippi Valley to restore conditions of marginal farm lands and forest lands located in flood prone areas for wildlife and enroll properties in conservation easements. Each alternative advocates the Service acquiring lands in Concordia Parish to enlarge the refuge, thereby reducing the acreage that could be developed. Lands adjacent to the refuge would increase in value, largely due to the value of those properties to private hunting clubs.

All alternatives afford additional land protection and low levels of development, thereby producing little negative effect on the cultural and historic environment. Potentially negative impacts could include logging, grazing, constructing of new trails or facilities, and developing of water impoundments. In most cases, these management actions would require review by the Regional Archaeologist and consultation with the Louisiana State Historic Preservation Office, as mandated by Section 106 of the National Historic Preservation Act. Determining whether a particular action within an alternative has the potential to affect cultural resources is an on-going process that would occur with 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 than any actions by a federal agency which may impact archaeological or historical resources be reviewed by the State Historic Preservation Office and that the identified impact be avoided or mitigated. Service policy is to preserve these resources in the public trust, avoiding impact whenever possible.

If significant and historic resources are found on lands within the refuge's proposed expansion area, land acquisition by the Service would provide some degree of protection. If acquisition of private lands did not occur and remained 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 historical data thereby decreasing opportunities for research. There is no designated wilderness area within the refuge.

The proposed actions will not signigicantly affect any unique characteristics of the geographic area.

Brown-headed cowbird
Bob Schmitz - Cornell Lab of Ornithology

Effects from Implementing Alternative A
The "No Action" Alternative (Current Management)

Implementing Alternative A is not considered the most effective management for meeting the purpose of the refuge. This alternative is included for purposes of establishing baseline conditions for comparison.

Alternative A may not achieve long-range goals and objectives within the 15-year planning period. It is considered the basis from which to compare the other alternatives. The "No Action" alternative would maintain the status quo and was developed using anticipated conditions in the Bayou Cocodrie watershed by the year 2015. It assumes that current conservation management and land protection programs and activities by the Service, state and local agencies, and private organizations would continue to follow past trends over the next 15 years, the planning horizon for this environmental assessment.

Fish, Wildlife, and Habitat

Under Alternative A, the purchase and reforestation of in-holdings and the management of winter hunting would be the primary management activities. Black bear habitat, including old growth, would be fully protected. Only the refuge impoundments would be actively managed. For the remaining portion of the refuge, the current habitat mix and configuration would remain the same. The forest block would remain fragmented or have a significant exposed edge, which is the condition that reduces the value of forests for migratory bird species and the Louisiana black bear. Overall, these conditions reduce the function of the ecosystem to support biologically diverse plant and animal communities. Furthermore, nest predators, including brown-headed cowbirds associated with the forest edge, would continue to depress breeding success of forest interior songbird species.

Existing forest habitats would receive little treatment under Alternative A, thus the quality of forests would not improve conditions for forest nesting birds and black bear. Open areas would be reforested as lands are acquired and refuge managers would initiate monitoring of forest habitats within the Brooks Brake Unit. Efforts would be made to ensure that existing canopy structures remain intact wherever possible.

Threatened and Endangered Species and Species of Management Concern

The black bear would benefit from refuge management actions which would include acquiring forest tracts for its recovery. Approximately 5,000 acres have been identified for acquisition. If acquired, the forest would be left alone with outside boundaries posted with refuge signs. New surveys and management of threatened and endangered species and species of management concern would not be implemented.

Game Species

The deer population is currently managed at a healthy carrying capacity. Small game population levels are primarily dictated by food availability, rather than by hunting pressure. Without support from an increased staff to provide additional biological services, such as monitoring wildlife populations, deer populations cannot be annually surveyed. It is believed that some vegetation may be negatively impacted by deer and feral hogs which would reduce the food and cover for resident and ground nesting species, resulting in a moderate impact overall.

Visitor Services and Environmental Education

The present visitor service and education program includes managing a big game, small game, and waterfowl hunting program. On an infrequent basis, and as a collateral duty, the staff gives presentations concerning refuge activities, such as Louisiana black bear recovery, to local schools and civic groups. Other than current trails and hunter check stations, the nearest public use facilities to support hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are found at St. Catherine Creek National Wildlife Refuge in Mississippi, about a 30-minute drive from the refuge. No new public use facilities would be developed under this alternative.

Hunting activities are presently managed as collateral duties of the refuge managers. Under this alternative, the risks of excess deer numbers and damages from over-browsing would be minimally managed. Over-browsing would remove shrub layers in forests and would cause the loss of associated animal species dependent on that habitat component. It would also reduce or eliminate forest canopy species targeted for habitat restoration, which is preferred by deer as winter browse. Controlling deer numbers manages the risks of damage to agricultural crops near the refuge and the risks of human injury and vehicle damage due to collisions with deer. The small game and waterfowl hunting programs would continue to be managed at current levels. The use of all-terrain vehicles would facilitate a more uniform deer harvest and increase the quality of the hunting experience. The use would be on a permit basis and limited to trails in the fall and winter.

Refuge Administration

This alternative would not change the current staffing level. Management of the hunting program and typical violations such as trespassing, poaching, and damaging property and habitat is performed by staff as a collateral duty. Violations may not be acted upon in a timely manner, and damage to property could continue depending on the availability and promptness of current staff to respond to problems. Access for enforcement and maintenance would continue to be difficult for current staff.

Currently, there is no biological monitoring program. Minimal information on values associated with old age timber and associated forest interior bird species would be monitored in the proposed Research Natural Area. No attempt to identify invertebrates, bats, amphibians, reptiles and/or fish would be made under this alternative. These populations would likely fluctuate with environmental changes.

Invasive plant species would not be treated under this alternative. Overabundant species may be managed. Consequently, the refuge would not provide viable habitat for many native plant and animal species.

Land Protection and Conservation

Under this alternative the Service would acquire the remaining 9,101 acres within the refuge acquisition boundary when and if the lands become available for purchase from willing sellers. At the rate the Service is acquiring land and at the rate of agricultural development, it is unlikely that the Service would be able to acquire the remaining land within the approved acquisition boundary and fully meet the purposes for which the refuge was established-that of protecting migratory birds, songbirds, and black bear and providing for wildlife-dependent recreation. A large, contiguous block of forest, requiring lands outside of the current acquisition boundary, would be needed for this purpose. Land protection would assist in supporting target species of Swainson's warbler, however, target population levels would not be realized by land protection objectives alone, since no forest habitat management activities would occur under Alternative A. Lands identified to support target species, such as the Cerulean warbler and swallow-tailed kite, would not be purchased under this alternative.

The Service supports recovery efforts of the Louisiana black bear by providing one full-time biologist to provide technical assistance and educate landowners in three parishes on recovery and management of the bear population. If the Service purchases the two forest tracts identified for black bear recovery, these protected forest tracts, coupled with existing refuge forests, would serve as movement corridors between the Red River Wildlife Management Area to the south and the Tensas National Wildlife Refuge to the north. However, these lands would not be sufficient to support a breeding population of black bear on the refuge.

Effects from Implementing Alternative B
The Service's Proposed Action

Implementing Alternative B is considered the most effective management for meeting the purpose of Bayou Cocodrie National Wildlife Refuge and for contributing to the ecosystem. This alternative is the Service's proposed management action.

Fish, Wildlife, and Habitat

The forest restoration program on refuge lands would be initiated and maintained under a 15-year time frame. Long-term management to mimic the structure and conditions of old growth in the Brooks Brake Unit would be maintained under a 20- to 40-year time frame. The overriding benefits of the proposed forest management would be the long-term protection and productivity of bottomland hardwood forests and wildlife habitat complexes characterizing the area.

The habitat distribution of the envisioned bottomland hardwood forests would result in increased benefits to forest interior and wetland species, as well as to wildlife populations that are of ecological and local concern. Other benefits would include an increase in wildlife species composition and diversity.

The forest habitats would be actively managed under Alternative B. The long-term results would be to restore the forest structure and composition to conditions that benefit priority bird species and the recovery of the Louisiana black bear, while at the same time providing sanctuary and habitat for waterfowl, shorebirds, and resident species.

Forest treatments would increase the proportion of mature forests, maintain and enhance the presence of mature and old growth forest components, and increase stand vigor. In some instances, trees more than 40 years old could be removed, where reduced competition and better spacing would enhance the longevity and vigor of neighboring desirable trees. The effect of these treatments would be to reduce the overall tree density, favoring larger, older trees with characteristics favorable to priority bird species and the Louisiana black bear. Such treatments promote the diameter and height growth of the remaining stand and accelerate the development of mature and old growth conditions or characteristics.

Spending most of its time near the ground searching for insects, the Swainson's warbler, another species of management concern, represents songbirds that inhabit canebrakes and dwarf palmetto. It breeds in large swamps and bottomlands and prefers nesting in dense cane near or over water. The existing refuge habitat has largely been degraded due to past land management practices and clearing of swamps and bottomlands. The forest habitat restoration described under Alternative B would positively benefit nesting and feeding habitat for this species, as well as other priority bird species including white-eyed vireo, prothonotary warbler, American woodcock, wood thrush, and hooded warbler.

Invasive species surveys and control efforts, refuge-wide, would result in restoration of native plant species and communities. Wildlife species would respond positively to the increased habitat. The refuge may periodically use approved pesticides to control invasive or overabundant species. The use of an Integrated Pest Management Plan approach specifies using techniques other than pesticides whenever possible, and when pesticides are used, the least and most specific type would be employed. Some quantity of pesticide would be introduced into the ecosystem, with an expectation of some impact on non-target species.

Game Species

Most refuge lands would be open to hunting. Though numbers may be seasonally reduced, the deer population would be managed at a healthy carrying capacity. Restrictions could occur if human activity were to cause disturbance to other wildlife or wildlife habitats. This would depend on the type and intensity of human activity, timing and number of activities occurring simultaneously, and the wildlife species and habitat impacted. Opening areas to deer hunting would increase the recreational opportunity and economical benefit, as well as provide greater flexibility in managing deer populations. It is believed that some vegetation may be negatively impacted by deer and feral hogs which would reduce the food and cover for resident and ground nesting species, resulting in a moderate impact overall. Small game population levels are primarily dictated by food availability rather than by hunting pressure.

Refuge Administration

The inventory and research of forest communities would provide incremental benefits to the biological environment. The inventory of rare species and communities would result in developing management strategies and techniques for existing and potential restoration sites. The Research Natural Area would serve as a demonstration and research site for academia and land management agencies. Management of research programs would improve ecological information and assist in improving management for rare species associated with old growth forests. Additional populations of species would be identified and, if appropriate, managed and enhanced. Habitat restoration may restore and recruit rare populations, including Swainson's and Cerulean warblers, and the Louisiana black bear.

Development of baseline surveys and long-term monitoring programs would improve the quality, defensibility, and evaluation of management actions, as well as provide information for conservation partners. Researching the long-term impacts on wildlife resources from forest fragmentation would improve and promote better habitat management practices and data utilized by land managers. Development of research results and the use of a Geographic Information System, along with monitoring data, would ensure cost-effective access and consistency of information by staff, partners, and the public. Evaluation of ongoing management activities that have the potential to adversely affect biological diversity would enable the Service to adapt new strategies in a manner least disruptive to other conservation management objectives. Increased attention to the prospect of global climate change and its effect on wildlife resources has facilitated reforestation efforts on the refuge, cooperative habitat enhancement on private lands, and corridor development.

Visitor Services and Environmental Education

Environmental education and recreational activities would be developed to complement the types of wildlife management projects on the refuge. Facility improvements would include upgrading and developing trails, developing wildlife observation areas, and adding a visitor contact station. Improving access to the refuge would facilitate public use and provide a quality experience for the visitor. Providing facilities and services may stimulate an ecotourism industry. Facility improvements and visitor use increases have the potential to cause disturbance to fish and wildlife species. If demand or use were to approach levels potentially harmful to habitat or wildlife, the staff would reevaluate access. Increased visitor use may cause temporary disturbance to wildlife in the immediate area.

The expanded staff would be available to visit and offer educational programs on wildlife management to local schools and civic groups. Wildlife observation and environmental education activities would be developed on an annual basis and coordinated with local school programs.

This alternative expands areas for deer, waterfowl, and small game hunting. Increasing the hunting opportunities should benefit the local economy through the sale of hunting licenses, supplies, equipment, and services. All-terrain vehicle access for hunting would be on a permit basis and limited to designated trails. The potential of conflicts between user groups may exist, and hunting may impact the distribution and use of various habitats by birds and disrupt foraging and pair/family bonds as the refuge would remain open for other activities during the hunting season. At times, some portions may be closed to provide needed sanctuary and minimize disturbance for migratory nesting birds and black bear.

Land Protection and Conservation

This alternative would result in the Service protecting up to 20,000 acres in the proposed expansion area, in addition to the 9,101 acres within the current refuge acquisition boundary. Lands acquired under this alternative would provide better protection for the entire watershed and its processes by ensuring water quantity and quality for wetlands, by providing more contiguous habitat for migrating birds, and by allowing for genetic exchange between populations of non-migrating species.

Increased land protection through planning and acquiring would result in a variety of economic benefits to Concordia Parish and local towns. Effective management and enlargement of the refuge would likely increase the value of surrounding lands. Of the three alternatives, Alternative B

would provide the greatest level of resource protection by adding more staff. Wildlife and their habitats, as well as archaeological and historical sites, would be afforded increased protection. The Service would increase staff to develop biological, forestry, recreation, and education programs which would add to the local economy. A biologist would provide technical assistance to landowners involved in black bear recovery efforts. The presence of more law enforcement staff would provide the necessary protection for the resources, as well as for visitors to the refuge.

Implementing Alternative B will not significantly affect any site listed in, or eligible for listing in the National Register of Historic Places, nor will they cause loss or destruction of scientific, cultural, or historic resources.

Alternative B could impact landowners as the Service seeks to expand the refuge boundary. If and when the boundary is expanded, specific measures and strategies identified in this environmental assessment would be initiated to ensure wildlife protection while considering the allowance of certain compatible, wildlife-dependent recreation activities. The Service would also work with landowners, conservation organizations, and agencies to support enrollment of up to 20,000 acres in private land conservation programs. Local economic benefits are available to landowners who enroll their lands in conservation programs administered by the U.S. Department of Agriculture, including the Wetlands Reserve Program. In return for enrolling, farmers receive an up-front payment from the Federal Government. The Federal Agricultural Improvement and Reform Act of 1996, administered by the Department of Agriculture's Natural Resources Conservation Service, authorized enrollment of 40 acres of land within the refuge acquisition boundary in the Wetlands Reserve Program and projected an increase of 3,000 acres in the program by the year 2001. If the Service purchases land for the refuge after it has been enrolled in the Wetlands Reserve Program, there would be no loss in agricultural production associated with that purchase, since the land would have already been taken out of agricultural production.

Based on the nature of the proposal, the location of the site and the current land use, the proposed alternative would not have any significant effects on the quality of the human environment, including public health and safety. The proposed actions will not have any adverse effects on the area's wetland and flood plains, pursuant to Executive Orders 11990 and 11988.

Implementing Alternative B would increase revenues from expanded visitor use as well as increase Service expenditures for equipment, supplies, and staffing needs. An enlarged office and visitor contact facility, along with storage and maintenance facilities proposed in this alternative, would directly impact an additional 1 to 4 acres. The impacts are related to a building-created impervious area, graveled entrance roads, and parking lots. Enlarging the headquarters office and adding a visitor contact facility would increase visitation and benefit the local economy. The refuge would consult with local and state officials during planning for, and construction of, the new facilities.

Cumulative Effects of the Proposed Action

There will be no cumulatively significant impacts on the environment. Cumulative impacts are actions that may be generated by various entities, including other federal or state agencies, local agencies, non-governmental organizations, and private landowners. Each of these groups would undertake actions related to land uses. The current size, condition, and

configuration of refuge forests are due to previous commercial harvesting impacts, water development projects, and agricultural activities. As a result, these actions create a cumulative impact resulting in the lack of sufficient protected native bottomland hardwood forests, and the variation in forest structures and conditions to support increases in forest breeding birds or the recovery of the Louisiana black bear on this site.

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

Unavoidable Adverse Effects of the Proposed Action

Unavoidable adverse impacts are projected from the changes in levels of management activities as described in the Service's proposed action.

The effects on the quality of the human environment are not likely to be highly contraversial or involve highly uncertain, unique, or unknown environmental risks to the human environment. Alternative B will not lead to a violation of federal, state, or local laws imposed for the protection of the environment.

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

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

Short-Term Use Versus Long-Term Productivity of the Proposed Action

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

Short-term economic effects would occur as a result of land purchases. There would be short-term impacts on tax collections for the year in which a property is acquired. In the long-term, however, land protection would reduce municipal service costs, while providing increased quality of life, essential habitat for wildlife, and by outdoor recreation. Any loss in taxes would be at least partially offset by the annual refuge revenue sharing payments.

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

All long-term impacts on biological resources are expected to be beneficial. Sites attracting threatened and endangered species would receive the highest priority for protection. Important stopover, feeding, and breeding habitat for migratory birds would be targeted for acquisition. Aquatic species, wide-ranging species, and species which require active management would benefit from habitat improvements, restoration, and land protection actions outlined in the comprehensive conservation plan. Technical assistance, environmental education, Partners-In-Flight grants, and Challenge Cost-Share Program grants would enhance area sensitive species on dedicated open space, privately owned lands, and refuge lands. Inter-jurisdictional fish populations would, in the long term, hopefully stabilize and begin recovery as a result of water quantity and quality improvements and through improvements in the protection and restoration of riparian habitat.

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

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

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

Irreversible and Irretrievable Commitments of Resources to the Proposed Action

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

The costs associated with land acquisition for the refuge would be

irreversible. Refuge land acquisition removes acreage from private ownership, as well as any potential development benefits. However, such land, once placed in public ownership under the National Wildlife Refuge System, provides a new set of uses and benefits a much broader group of people. Traditional public uses may change, since public uses on a refuge must be shown to be appropriate and compatible with the purposes for which land is acquired. Structural improvements that are purchased with any land may be declared surplus to government needs, and sold or demolished on site. Federal ownership may affect surrounding land-use patterns, local economies and parish tax revenues. Property located adjacent to refuge lands generally increases in value, landscapes become protected, revenues to local service businesses increase, and costs to local parishes for services decrease.

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

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

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

Effects from Implementing Alternative C

Implementing Alternative C represents an increase in land and forest management activities from Alternative B, with long-term management resulting in a significant increase in forest stand structure that mimics conditions similar to old growth. This alternative is considered effective management for meeting the purpose of Bayou Cocodrie National Wildlife Refuge and for contributing to the ecosystem.

Fish, Wildlife, and Habitat

This alternative would result in the development and implementation of old growth plant species composition. It would further assist in achieving the Service's Partners-in-Flight goals to increase forest breeding songbird habitat and population levels. Because of the increased attention to old growth composition, the Service would meet habitat needs of other trust species, including black bear. Alternative C would provide an area on the refuge to be designated as a Research Natural Area or sanctuary to reduce the stress on wildlife species and decrease the potential for conflicts between user groups, including researchers.

The primary benefits of implementing Alternative C are the long-term protection, management, and restoration of forest stages that once characterized this area. Old growth forests are the most under-represented forest type in the Lower Mississippi Valley. Old growth forests support a large number of species, among which are several high priority bird species.

The old growth forest found in the Brooks Brake Unit survives as a productive, isolated remnant. The habitat distribution of the bottomland hardwood forest envisioned would result in increased benefits to forest interior wildlife populations that are of ecological and local concern (*i.e.*, populations of Louisiana black bear, swallow-tailed kite). Other benefits include an increase in wildlife species populations, composition, and diversity. Water impoundments would not be managed under this alternative, and as a result, benefits to waterfowl and shorebird populations would not be realized.

The forest habitats on most of the refuge, excluding the old growth area, are in poor condition. The passive management that would occur under this alternative would begin the process of developing an even-aged forest stage approach. In keeping with Service policy, wildfires would be suppressed. Tree density would remain high and species conversion to shade tolerant types would continue. Old growth forests, once abundant but currently scarce in the Lower Mississippi Valley, are important to native wildlife. Late successional forest communities have declined more than 95 percent with only a few isolated stands remaining.

The riparian areas are in very poor condition between the refuge and other public lands due to clearing and the use of pesticides on farm lands. Alternative C would promote the restoration and development of riparian forests, especially those that have been affected by agricultural production.

As for invasive and overabundant species, the consequences of implementing this alternative would be the same as Alternative B. The white-tailed deer population would increase over the short term but likely decline as forests begin to exhibit closed canopy conditions.

Visitor Services and Environmental Education

The consequences of implementing this alternative would, for the most part, be the same as Alternative B. Exceptions include a likely decrease in the white-tailed deer population resulting in a decrease in hunting opportunities and a likely increase in wildlife viewing and opportunities to photograph forest dwelling species.

Land Protection and Conservation

This alternative would result in the Service protecting up to 28,000 acres in the proposed expansion area, in addition to the 9,101 acres within the current refuge acquisition boundary. At the rate the Service is acquiring land and at the rate of agricultural development, it is unlikely that the Service would be able to acquire the remaining land within the approved acquisition boundary and fully meet the purposes for which the refuge was established-that of protecting migratory birds, songbirds, and populations of Louisiana black bear and providing for wildlife-dependent recreation. A large contiguous block of forest would be needed to support target forest breeding birds such as Swainson's and Cerulean warblers, and swallow-tailed kite, as well as black bear, while also increasing public visitation for hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

Alternative C could impact landowners as the Service seeks to expand the refuge boundary. If, and when, the boundary is expanded, specific measures and strategies identified in this environmental assessment would be initiated to ensure wildlife protection, while considering the allowance of certain appropriate and compatible wildlife-dependent recreation activities. The Service would also work with landowners, conservation organizations, and agencies to support enrollment of up to 20,000 acres in private land conservation programs. Local economic benefits are available to landowners who enroll their lands in conservation programs

administered by the U.S. Department of Agriculture, including the Wetlands Reserve Program. In return for enrolling, farmers receive an up-front payment from the Federal Government. The Federal Agricultural Improvement and Reform Act of 1996, administered by the Department of Agriculture's Natural Resources Conservation Service, authorized enrollment of 40 acres of land within the refuge acquisition boundary in the Wetlands Reserve Program and projected an increase of 3,000 acres in the program by the year 2001. If the Service purchases land after it has been enrolled in the Wetlands Reserve Program, there is no loss in agricultural production associated with that purchase, since the land has already been taken out of production.

Through ownership, protection and management of refuge lands, the Service can limit adverse impacts to fish, wildlife, and habitats by reducing deforestation-the principal threat facing wildlife. Recovery of songbird species along their migration routes depends upon the availability of sufficient, undisturbed nesting and feeding habitat to allow both juvenile and adult birds to carry out their life processes. Alternative C proposes to protect and maintain habitat for forest dwelling wildlife. Forest management, including the conversion of farmlands to mixed bottomland hardwoods, promotes increased hard and soft mast production. Preservation and monitoring to improve habitat conditions in mature hardwood stands would benefit forest dwelling birds.

V. Consultation and Coordination

Public Involvement Process

Public involvement was sought throughout the planning process through meetings, open houses, and personal contacts. In September 1997, notices were mailed to landowners, various groups, and agencies announcing planning workshops. Comments were received and documented from meeting attendees, as well as through discussions with individuals and public agencies throughout the planning process. Using the information obtained, the team developed an abbreviated list or summary of statements reflecting major issues and concerns. This summary is found in the Draft Comprehensive Conservation Plan, Chapter III.

The Louisiana Department of Wildlife and Fisheries is an important partnering agency whose management provides significant benefits toward the protection of fish and wildlife habitat. Specific kinds of management include reforestation of state and private property and management and land acquisition efforts for the recovery of threatened and endangered species, including the Louisiana black bear. The State also administers scenic stream protection for the Bayou Cocodrie River and manages the Red River/Three Rivers Wildlife Management Area Complex in Concordia Parish.

The interest and dedication of private landowners in conservation management are resulting in incremental benefits to fish and wildlife. The most notable benefits, as a result of the Farm Improvement Act of 1996, include partnerships between farmers and the U.S. Department of Agriculture using various conservation programs. The Department of Agriculture administers such programs as the Wetland Reserve Program and the Conservation Reserve Program which are extensively utilized by landowners. Landowners who participate in the Wetlands Reserve Program record a conservation easement on their property or enter into a restoration agreement in exchange for land payments and/or cost-share payments for restoration practices. The Conservation Reserve Program is administered by taking highly erosive lands out of farm production and restoring them to benefit wildlife.

Acknowledgments

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Kevin Bridgewater The Natural Resource Conservation Service - Wetland Reserve Program
Cindy Brown The Nature Conservancy, Louisiana - land protection and conservation, ecosystem management
Kevin Case Farm Service Agency - Conservation Reserve Program
Concordia Parish Police Jury Road improvements, access to property
Keith Ouchley, Ph.D. The Nature Conservancy, Louisiana - avian management, land protection and conservation, biological review
Rena Pitts Farmer, access to property, local history
Burl Roberts Farmer - access to refuge
Reggie Wycoff Louisiana Department of Wildlife and Fisheries Biologist - Wildlife, fish and game management comments

Figure 24 lists the planning team members and their expertise.

Figure 24. Planning Team Member Expertise

Don Anderson, Refuge Biologist - Black bear management and coordination
Ray Aycock, Wildlife and Habitat Management Biologist - Wildlife management, writing
Charles Baxter, Joint Venture Coordinator-Ecosystem management, writing, GIS support
Angela Bivens, Visual Information Specialist - Graphic production, cartographic production
Roger Boykin, Forester - Forest management, Goals and objectives, review
Jim Clark, Visual Information Specialist - Graphic production, cartographic production
Mike Dawson, Realty Biologist - Review
Blaine Elliot, Joint Venture Biologist - GIS support, analysis, ecosystem management
Mike Esters, Refuge Manager - Refuge management and operations, goals and objectives
Jerome Ford, Refuge Manager - Public involvement, plan development, review
Anita Goetz, Private Lands Biologist - Private lands coordination, review
Chuck Hunter, Supervisory Biologist - Avian management and monitoring, goals and objectives, biological methodology, review
Rose Hopp, Realty Biologist - Writing and review
Deborah Jerome, Planning Team Leader - Writing and plan development, goals and objectives, team coordination, review
Pete Jerome, Refuge Supervisor - Refuge management, goals and objectives, GIS analysis, review
Rick Kanaski, Regional Archaeologist - Goals and objectives, writing and coordination
Kurt McMurl, Joint Venture Biologist - GIS support, analysis, ecosystem management
Seth Mott, Lower Mississippi Joint Venture Biologist - Goals and objectives
Evelyn Nelson, Writer-Editor
Tom Prusa, Assistant Refuge Supervisor - Refuge review
Donna Stanek, Outdoor Recreation Planner - Visitor services, goals and objectives, public involvement, writing and review, plan development
Bob Strader, Private Lands Biologist - Black bear protection, technical review

Adaptive Management	A process in which projects are implemented within a framework of scientifically driven experiments to test predictions and assumptions outlined within the comprehensive conservation plan. The analysis of the outcome of project implementation helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.
Alternative	Alternatives are different means of accomplishing refuge purposes, goals and objectives and contributing to the National Wildlife Refuge System. A reasonable way to fix the identified problem or satisfy the stated need.
Approved refuge boundary	A project boundary which the Fish and Wildlife Service approves upon completion of the planning and environmental compliance process.
Bayou	A minor river or secondary watercourse, usually sluggish or back flooding water flow.
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. The National Wildlife Refuge System focus is on indigenous species, biotic communities and ecological processes.
Canebrake	Cane stand (Arundinaria gigantea) that under present day conditions grows in disturbed areas and frequently persists in small closed-canopy patches at Bayou Cocodrie National Wildlife Refuge. Historically cane was in large (could be square miles) disturbed areas (frequent flooding) under open canopies. Habitat is unique and valued for ground- mid story structure for Swainson's warbler.

Canopy	A layer of foliage; generally the upper-most layer, in a forest stand. It can be used to refer to mid- or under-story vegetation in multi-layered stands. Canopy closure is an estimate of the amount of overhead tree cover (also canopy cover).
Categorical Exclusion	A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a federal agency pursuant to the National Environmental Policy Act.
CFR	Code of Federal Regulations.
Compatible Use	A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Refuge Manager, will not materially interfere with, or detract from, the fulfillment of the mission or the purposes of the refuge. A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.
Comprehensive Conservation Plan	A document that describes the desired future conditions of the refuge; provides long-range guidance and management direction for the Refuge Manager to accomplish the purposes, goals and objectives of the refuge; and contributes to the mission of the National Wildlife Refuge System, and to meet relevant mandates.
Conservation easement	A legal document that provides specific land-use rights to a secondary party. A perpetual conservation easement usually grants conservation and management rights to a party in perpetuity.

Cooperative Agreement	A simple habitat protection action in which no property rights are acquired. An agreement is usually long-term and can be modified by either party. Lands under a cooperative agreement do not necessarily become part of the National Wildlife Refuge System.
Corridor	A route that allows movement of individuals from one region or place to another.
Cover Type	The present vegetation of an area.
Cultural Resources	The remains of sites, structures, or objects used by people of the past.
Cypress and Tupelo Swamp	Found in low lying areas - swales and open ponds – that hold water several months, if not all of the year. Large hollow trees are used as bear den sites.
Deciduous	Pertaining to perennial plants that are leafless for sometime during the year.
Ecological Succession	The orderly progression of an area through time in the absence of disturbance from one vegetative community to another.
Ecosystem	A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.
Ecosystem Management	Management of natural resources using systemwide 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.
Even-Aged Forests	Forests that are composed of trees with a time span of less than 20 years between oldest and youngest individuals.
Emergent growth/Revegetation	Farmland or logged timber that has been reforested (early succession) or may be naturally revegetated.

Endangered Species	A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.
Endemic Species	Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.
Environmental Assessment	A concise document, prepared in 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.
Fauna	All the vertebrate or invertebrate animals of an area.
Federal Trust Species	All species where the Federal Government has primary jurisdiction including federally threatened or endangered species, migratory birds, anadromous fish, and certain marine mammals.
Fee-title	The acquisition of most or all of the rights to a tract of land. There is a total transfer of property rights with the formal conveyance of a title. While a fee title acquisition involves most rights to a property, certain rights may be reserved or not purchased, including water rights, mineral rights, or use reservation (the ability to continue using the land for a specified time period, or the reminder of the owner's life).
Finding of No Significant Impact	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.

Flood plain Woods	Bottomland Hardwood Forests. Consists of hardwoods (old growth and mid-succession age timber) cypress tupelo stands found on low ridges that drain slowly and subject to flooding. Overcup, willow, water oaks, sweetgum, green ash. Old growth- Typically exceeding 120 years of age. Red oaks were removed in the 1940's. Mid-succession- Logged timber that may need restoration to improve wildlife habitat. Missing several key oak species.
Fragmentation	The process of reducing the size and connectivity of habitat patches. The disruption of extensive habitats into isolated and small patches.
Goal	Descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose but does not define measurable units.
Geographic Information System	A computer system capable of storing and manipulating spatial data.
Ground story (flora)	Vascular plants less than one meter in height, excluding tree seedlings.
Herbaceous wetland	Annually or seasonally inundated with vegetation consisting primarily of grasses, sedges, rushes, and cattail.
Habitat	The place where an organism lives. The existing environmental conditions required by an organism for survival and reproduction.
Indicator Species	A species of plant or animals that is assumed to be sensitive to habitat changes and represents the needs of a larger group of species.
In-holding	Privately owned land inside the boundary of a national wildlife refuge.
Issue	Any unsettled matter that requires a management decision.
Mid-Succession Forest	A forest generally characterized by even-age structure resulting from human disturbance such as timber harvest. Mid-successional forest

may contain mature trees but the forest as a whole does not exhibit functional or structural characteristics associated with old growth conditions.

Migratory ..... The seasonal movement from one area to another and back.

Monitoring..... The process of collecting information to track changes of selected parameters over time.

National Environmental Policy ..... Requires all agencies, including the Service, to examine the Act of 1969 environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate this Act with other planning requirements, and prepare appropriate policy documents to facilitate better environmental decision making.

National Wildlife Refuge ..... A designated area of land, water, or an interest in land or water within the National Wildlife Refuge System.

National Wildlife Refuge System .... 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, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas.

Native Species ..... Species that normally live and thrive in a particular ecosystem.

Neotropical Migratory Bird ..... A bird species that breeds north of the United States/Mexican border and winters primarily south of that border, which includes Mexico, West Indies, Central America and part of South America.

Natural levee	Natural embankment created by soil deposited as a stream over-tops its banks. Located adjacent to a stream, a natural levee is often the highest ground in a bottomland or swamp type area.
Objective	An objective is a concise quantitative (where possible) target statement of what will be achieved. Objectives are derived from goals and provide the basis for determining management strategies. Objectives should be attainable and time-specific.
Old growth Forest	Forested areas lacking frequent disturbance to vegetation, usually characterized by dominant species entered into a late successional stage; usually associated with high diversity of species, specialization, and structural complexity.
Planning Area	A planning area my include lands outside existing planning unit boundaries that are being studied for inclusion in the unit and/or partnership planning efforts. It may also include watersheds or ecosystems that affect the planning area.
Planning Team	A planning team prepares the Comprehensive Conservation Plan. Planning teams are interdisciplinary in membership and function. A team generally consists of the a planning team leader; refuge manager and staff biologists; staff specialists or other representatives of Service programs, ecosystems or regional offices; and state partnering wildlife agencies as appropriate.
Preferred Alternative	This is the 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.

Refuge Operating Needs System	This is a national database which contains the unfunded operational needs of each refuge. Projects included are those required to implement approved plans and meet goals, objectives, and legal mandates.
Refuge Purposes	The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.
Seral Forest	A forest in the mature stage of development, usually dominated by large, old trees.
Sink	A habitat in which local mortality exceeds local reproductive success for a given species.
Sink Population	A population in a low-quality habitat in which birth rate is generally less than the death rate and population density is maintained by immigrants from source populations.
Source	A habitat in which local reproductive success exceeds local mortality for a given species.
Source Population	A population in a high-quality habitat in which birth rate greatly exceeds death rate and the excess individuals leave as migrants.
Step-down Management Plans	Step-down management plans provide the details necessary to implement management strategies and projects identified in the comprehensive conservation plan.
Strategy	A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives.
Threatened Species	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.

Understory	Any vegetation with canopy below or closer to the ground than canopies of other plants.
Wildlife Corridor	A landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat dedicated to conservation functions. Such corridors may facilitate several kinds of traffic, including frequent foraging movement, seasonal migration, or the once in a lifetime dispersal of juvenile animals. These are transition habitats and need not contain all the habitat elements required by migrants for long-term survival or reproduction.
Wildlife-Dependent Recreation	A use of a refuge involving hunting, fishing, wildlife observation, wildlife photography and environmental education and interpretation. The National Wildlife Refuge System Improvement Act of 1997 specifies that these are the six priority general public uses of the system.

Appendix II

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Appendix III
Relevant Legal Mandates

National Wildlife Refuge System Authorities

The mission of the Fish and Wildlife Service is to conserve, protect, and enhance the Nation's fish and wildlife and their habitats for the continuing benefit of the American people. The Service is the primary federal agency responsible for migratory birds, endangered plants and animals, certain marine mammals, and anadromous fish. This responsibility to conserve our Nation's fish and wildlife resources is shared with other federal agencies and state and tribal governments.

As part of this responsibility, the Service manages the National Wildlife Refuge System. This system is the only nationwide system of federal land managed and protected for wildlife and their habitats. The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

The Bayou Cocodrie National Wildlife Refuge is managed as part of this system in accordance with the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, the Refuge Recreation Act of 1962, Executive Order 12996 (Management and General Public Use of the National Wildlife Refuge System), and other relevant legislation, Executive Orders, regulations, and policies.

Key Legislation/Policies for Plan Implementation

The Bayou Cocodrie National Wildlife Refuge Draft Comprehensive Conservation Plan describes and illustrates management area projects with standards and guidelines for future decision making and may be adjusted through monitoring and evaluation, as well as amendment and revision. The plan approval establishes conservation and land protection goals, objectives, and specific strategies for the refuge and its expansion. Compatible recreation uses specific to the refuge have been identified and approved by the Refuge Manager (Appendix G). This plan provides for systematic stepping down from the overall direction as outlined when making project or activity level decisions. This level involves site-specific analysis (e.g., Forest Habitat Management Plan) to meet National Environmental Policy Act requirements for decision making.

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

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

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

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

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

Fish and Wildlife Coordination Act (1958): Allows the Fish and Wildlife Service to enter into agreements with private landowners for wildlife management purposes.

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

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

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. (Refuge Administration 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 for which the refuge was established. The Refuge Improvement Act clearly defines a unifying mission for the refuge system; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation, wildlife photography and environmental education and interpretation); establishes a formal process for determining compatibility; established the responsibilities of the Secretary of the Interior for managing and protecting the System; and requires a Comprehensive Conservation Plan for each refuge by the year 2012. This Act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

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

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

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

Rehabilitation Act (1973): Requires that programmatic and physical accessibility be made available in any facility funded by the Federal Government, ensuring that anyone can participate in any program.

Clean Water Act (1977): Requires consultation with the U.S. Army Corps of Engineers for major wetland modifications.

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

Emergency Wetlands Resources Act (1986): The purpose of the Act is "To promote the conservation of migratory waterfowl and to offset or prevent the serious loss of wetlands by the acquisition of wetlands and other essential habitat, and for other purposes."

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

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

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

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

Emergency Wetland Resources Act of 1986: This Act authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act also requires the Secretary of the Interior to establish a National Wetlands Priority Conservation Plan, requires the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund an amount equal to import duties on arms and ammunition.

Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended: Public Law 93-205, approved December 28,1973, repealed the Endangered Species Conservation Act of December 5,1969 (P.L. 91-135, 83 Stat. 275). The 1969 act amended the Endangered Species Preservation Act of October 15,1966 (P.L. 89-669, 80 Stat. 926). The 1973 Endangered Species Act provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend, both through federal action and by encouraging the establishment of state programs. The Act authorizes the determination and listing of species as threatened and endangered; prohibits unauthorized taking, possession, sale, and transport of endangered species; provides authority to acquire land for the conservation of listed species, using land and water conservation funds; authorizes establishment of cooperative agreements and grants-in-aid to states that establish and maintain active and adequate programs for threatened and endangered wildlife and plants; authorizes the assessment of civil and criminal penalties for violating the Act or regulations; and authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction of anyone violating the Act and any regulation issued thereunder.

Environmental Education Act of 1990(20 USC 5501-5510; 104 Stat. 3325): Public Law 101-619, signed November 16,1990, established the Office of Environmental Education within the Environmental Protection Agency to develop and administer a federal environmental education program. Responsibilities of the Office include developing and supporting programs to improve understanding of the natural and developed environment, and the relationships between humans and their environment; supporting the dissemination of educational materials; developing and supporting training programs and environmental education seminars; managing a federal grant program; and administering an environmental internship and fellowship program. The Office is required to develop and support environmental programs in consultation with other federal natural resource management agencies, including the Fish and Wildlife Service.

Executive Order 11988, Flood plain Management: The purpose of this Executive Order, signed May 24, 1977, 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 flood plain 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 flood plains."

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

Historic Preservation Acts include:
Antiquities Act (16 USC 431 - 433)--The Act of June 8, 1906, (34 Stat. 225) authorizes the President of the United States to designate as National Monuments objects or areas of historic or scientific interests on lands owned or controlled by the United States. The Act required that a permit be obtained for examination of ruins, excavation of archaeological sites and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army, and provided penalties for violations.

Archaeological Resources Protection Act (16 U.S.C. 470aa - 47011)-- Public Law 96-95, approved October 31, 1979, (93 Stat. 721) largely supplanted the resource protection provisions of the Antiquities Act for archaeological items. This Act established detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from Federal and Indian lands. It also established civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resources; for any trafficking in such resources removed from Federal and Indian lands in violation of any provision of federal law; and for interstate and foreign commerce in such resources acquired, transported or received in violation of any state or local law.

Public Law 100-588, approved November 3, 1988, (102 Stat. 2983) lowered the threshold value of artifacts triggering the felony provisions of the Act from $5,000 to $500, made attempting to commit an action prohibited by the Act a violation, and required the land managing agencies to establish public awareness programs regarding the value of archaeological resources to the nation.

Archaeological and Historic Preservation Act (16 U.S.C. 469-469c)--Public Law 86-523, approved June 27, 1960, (74 Stat. 220), and amended by Public Law 93-291, approved May 24, 1974, (88 Stat. 174), directed federal agencies to notify the Secretary of the Interior whenever a federal, federally assisted, or licensed or permitted project may cause loss or destruction of significant scientific, prehistoric or archaeologic data. The Act authorized use of appropriated, donated and/or transferred funds for the recovery, protection and preservation of such data.

Historic Sites, Buildings and Antiquities Act (16 U.S.C. 461-462, 464-467)--The Act of August 21,1935, (49 Stat. 666) popularly known as the Historic Sites Act, as amended by Public Law 89-249, approved October 9,1965, (79 Stat. 971), declared it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provided

procedures for designation, acquisition, administration and protection of such sites. Among other things, National Historic and Natural Landmarks are designated under authority of this Act. As of January, 1989, thirty-one national wildlife refuges contained such sites.

National Historic Preservation Act of 1966 (16 U.S.C. 470-470b, 470c-470n)--Public Law 89-665, approved October 15,1966, (80 Stat. 915) and repeatedly amended, provided for preservation of significant historical features (buildings, objects and sites) through a grant-in-aid program to the states. It established a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468-468d).

The Act established an Advisory Council on Historic Preservation, which was made a permanent independent agency in Public Law 94-422, approved September 28,1976 (90 Stat. 1319). That Act also created the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or sites listed in, or eligible for listing in, the National Register of Historic Places. As of January 1989, ninety-one such sites on national wildlife refuges are listed in this Register.

Land and Water Conservation Fund Act of 1948: This act provides funding through receipts from the sale of surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources of land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies, including the Fish and Wildlife Service.

Migratory Bird Hunting and Conservation Stamp Act (16 U.S.C. 718-718j, 48 Stat. 452), as amended: The "Duck Stamp Act," of March 16,1934, requires each waterfowl hunter, 16 years of age or older, to possess a valid federal hunting stamp. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations.

National and Community Service Act of 1960 (42 U.S.C. 12401:104 Stat. 3127), Public Law 101-610, signed November 16,1990, authorizes several programs to engage citizens of the United States in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Several provisions are of particular interest to the Fish and Wildlife Service.

American Conservation and Youth Service Corps: A federal grant program established under Subtitle C of the law, the Corps offers an opportunity for young adults between the ages of 16-25, or in the case of summer programs, 15-21, to engage in approved human and natural resources projects which benefit the public or are carried out on Federal or Indian lands. To be eligible for assistance, natural resource programs must focus on improvement of wildlife habitat and recreational areas, fish culture, fishery assistance, erosion, wetlands protection, pollution control and similar projects. A stipend of not more than 100 percent of the poverty level will be paid to participants. A Commission established to administer the Youth Service Corps will make grants to States, the Secretaries of Agriculture and Interior and the Director of ACTION to carry out these responsibilities.

National Environmental Policy Act of 1959 (P.L. 91-190,42 U.S.C. 4321-4347, January 1, 1970, 83 Stat. 852) as amended by Public Law 94-52, July 3, 1975, 89 Stat. 258, and Public Law 94-83, August 9,1975, 89 Stat. 424). Title I of the 1969 National Environmental Policy Act requires that all federal agencies prepare detailed environmental impact statements for "every recommendation or report on proposals for legislation and other

major federal actions significantly affecting the quality of the human environment." The 1969 statute stipulated the factors to be considered in environmental impact statements, and required that federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unquantified environmental values are given appropriate consideration, along with economic and technical considerations. Title II of this statute requires annual reports on environmental quality from the President to the Congress, and established a Council on Environmental Quality in the Executive Office of the President with specific duties and functions.

National Wildlife Refuge System Improvement Act of 1997: Public Law 105-57, amended the National Wildlife Refuge System Act of 1966 (16 U.S.C. 668dd-ee), and provided guidance for management and public use of the refuge system. The Act mandates that the refuge system be consistently directed and managed as a national system of lands and waters devoted to wildlife conservation and management. The Act establishes priorities for recreational uses of the refuge system. Six wildlife-dependent uses are specifically named in the Act: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. These activities are to be promoted on the refuge system, while all non-wildlife-dependent uses are subject to compatibility determinations. A compatible use is one which, in the sound professional judgement of the Refuge Manger, will not materially interfere with, or detract from, fulfillment of the National Wildlife Refuge System Mission or refuge purpose(s). As stated in the Act, "The mission of the system is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." The Act also requires development of a Comprehensive Conservation Plan for each refuge and that management be consistent with the plan. When writing a plan for expanded or new refuges, and when making management decisions, the Act requires effective coordination with other federal agencies, state fish and wildlife or conservation agencies, and refuge neighbors. A refuge must also provide opportunities for public involvement when making a compatibility determination.

North American Wetlands Conservation Act (103 Stat. 1968; 16 U.S.C. 4401~4412) Public Law 101-233, enacted December 13, 1989, provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on Wetlands between Canada, the United States and Mexico. The Act converts the Pittman-Robertson account into a trust fund, with the interest available without appropriation through the year 2006, to carry out the programs authorized by the Act, along with an authorization for annual appropriation of $15 million plus an amount equal to the fines and forfeitures collected under the Migratory Bird Treaty Act. Available funds may be expended, upon approval of the Migratory Bird Conservation Commission, for payment of not to exceed 50 percent of the United States' share of the cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on federal lands). At least 50 percent and no more than 70 percent of the funds received are to go to Canada and Mexico each year.

Refuge Recreation Act of 1952: 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.

Refuge Revenue Sharing Act (16 U.S.C. 715s) Section 401 of the Act of June 15,1935, (49 Stat. 383) provided for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges. Public Law 88-523, approved August 30,1964, (78 Stat. 701) made major revisions by requiring that all revenues received from refuge products, such as animals, timber and minerals, or from leases or other privileges, be deposited in a special Treasury account and net receipts distributed to counties for public schools and roads. Public Law 93-509, approved December 3,1974, (88 Stat. 1603) required that moneys remaining in the fund after payments be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act. Public Law 95-469, approved October 17, 1978, (92 Stat. 1319) expanded the revenue sharing system to include National Fish Hatcheries and Service research stations. It also included in the Refuge Revenue Sharing Fund receipts from the sale of salmonid carcasses. Payments to counties were established as follows: on acquired land, the greatest amount calculated on the basis of 75 cents per acre, three-fourths of one percent of the appraised value, or 25 percent of the net receipts produced from the land; and on land withdrawn from the public domain, 25 percent of net receipts and basic payments under Public Law 94-565 (31 U.S.C. 1601-1607, 90 Stat. 2662). This amendment also authorized appropriations to make up any difference between the amount in the fund and the amount scheduled for payment in any year. The stipulation that payments be used for schools and roads was removed, but counties were required to pass payments along to other units of local government within the county which suffer losses in revenues due to the establishment of Service areas.

Wilderness Act of 1954: Public Law 88-577, approved September 3,1964, directed the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems for inclusion in the National Wilderness Preservation System.

Appendix IV
Biota

Threatened, Endangered, and Candidate Species

The federally listed Louisiana Black Bear is the only known listed species to occasionally occur on the refuge, although the Rafinesque's big-eared bat is another likely candidate. Formerly listed species such as the American alligator and the bald eagle appear on the refuge. The Louisiana black bear is targeted for special reintroduction emphasis in the future as part of a population recovery effort to delist this species. The refuge will not only serve as permanent habitat for this species, but will serve as habitat linkage for the Atchafalaya population and the Tensas Basin population which will ensure genetic diversity. Other potential candidate species include the alligator snapping turtle and the wood stork.

The Florida panther and the red wolf were also former residents of this area, but none have been documented in the last 40 years.

Figure 25. Refuge Biota

Birds

Total species 186

Breeding species 68
a = abundant c = common u = uncommon r = rare
* species with confirmed breeding records

Common Name		*Spring March – May*	*Summer May–August*	*Fall Winter Sept-Nov*
Pied-billed Grebe	u	r	u	u
White Pelican	r		r	r
Double-crested Cormorant	c	c	a	a
Anhinga*	u	c	u	r
American Bittern	r		r	
Least Bittern	r	r	r	
Great Blue Heron*	c	a	c	c
Great Egret*	c	a	c	u
Snowy Egret*	c	a	c	r
Little Blue Heron*	c	a	c	
Cattle Egret*	c	a	c	u
Green-backed Heron*	c	c	u	
Black-crowned Night-Heron*	u	u	u	
Yellow-crowned Night-Heron*	u	a	u	
White Ibis	u	c	u	
Wood Stork				r
Greater White-fronted Goose				u
Snow Goose				u
Ross' Goose				r
Canada Goose				r
Wood Duck*	a	a	a	a
Green-winged Teal			c	u
Black Duck				r
Mottled Duck				u
Mallard				a
Northern Pintail				c
Blue-winged Teal			c	r
Northern Shoveler				c
Gadwall				u
American Wigeon				u
Ring-necked Duck				u
Lesser Scaup				r
Hooded Merganser*	u	c	u	u

Common Name		*Spring March – May*	*Summer May–August*	*Fall Winter Sept-Nov*
Black Vulture*	a	a	a	a
Mississippi Kite*	c	c	c	
Bald Eagle	r		r	r
Northern Harrier			u	u
Sharp-shinned Hawk	u		u	c
Cooper's Hawk*	u	r	u	c
Red-shouldered Hawk*	a	a	a	a
Broad-winged Hawk	u	r	u	
Red-tailed Hawk*	c	u	c	a
American Kestrel	c	r	c	c
Merlin				r
Wild Turkey*	c	c	c	c
Northern Bobwhite*	u	u	u	u
King Rail	r		r	
Sora	u		u	
Common Moorhen	r		r	
American Coot	u		u	c
Killdeer*	a	a	a	a
Greater Yellowlegs	u		u	r
Lesser Yellowlegs	u		u	r
Solitary Sandpiper	c		u	
Spotted Sandpiper	u		u	r
Semipalmated Sandpiper	u		u	
Least Sandpiper	u		u	u
Pectoral Sandpiper	u		u	
Western Sandpiper	u		u	r
Short-billed Dowitcher	u		u	u
Long-billed Dowitcher	r		r	
Common Snipe	u		u	c
American Woodcock	u		u	c
Ring-billed Gull	u		u	u
Rock Dove	r	r	r	r
Mourning Dove*	a	a	a	a
Common Ground-Dove				r
Black-billed Cuckoo	u		r	
Yellow-billed Cuckoo*	c	a	u	
Common Barn Owl	r	r	r	r
Eastern Screech Owl*	c	c	c	c

Common Name		*Spring March – May*	*Summer May–August*	*Fall Winter Sept-Nov*
Great Horned Owl*	u	u	u	u
Barred Owl*	a	a	a	a
Common Nighthawk	u	c	u	
Chuck-will's-widow	u	c	u	
Whip-poor-will	u		r	
Chimney Swift*	c	c	c	
Ruby-throated Hummingbird*	a	a	c	
Belted Kingfisher	c	c	c	c
Red-headed Woodpecker*	c	c	c	a
Red-bellied Woodpecker*	a	a	a	a
Yellow-bellied Sapsucker	u		u	c
Downy Woodpecker*	c	c	c	c
Hairy Woodpecker*	u	u	u	u
Northern Flicker	u	u	u	c
Pileated Woodpecker*	c	c	c	c
Eastern Wood-Pewee*	c	c	c	
Acadian Flycatcher*	a	a	a	
Eastern Phoebe	u		u	c
Great Crested Flycatcher*	c	a	c	
Eastern Kingbird	c	c	c	
Horned Lark*	u	u	u	c
Purple Martin	c	c	c	
Tree Swallow	c		c	
Northern Rough-winged Swallow	c	u	c	
Barn Swallow	c	c	c	
Blue Jay*	c	u	c	c
American Crow*	c	c	c	c
Fish Crow	u	u	u	u
Carolina Chickadee*	a	a	a	a
Tufted Titmouse*	a	a	a	a
Red-breasted Nuthatch				r
White-breasted Nuthatch				r
Brown-headed Nuthatch	r	r	r	r
Brown Creeper				u
Carolina Wren*	a	a	a	a
House Wren	r		r	u
Winter Wren	r		r	u
Sedge Wren	r		r	r

Common Name		*Spring March – May*	*Summer May–August*	*Fall Winter Sept-Nov*
Golden-crowned Kinglet	c		u	c
Ruby-crowned Kinglet	a		c	a
Blue-gray Gnatcatcher*	a	a	a	r
Eastern Bluebird	c	c	c	c
Veery	u		r	
Gray-checked Thrush	c		u	
Swainson's Thrush	c		u	
Hermit Thrush	c		u	
Wood Thrush*	c	u	u	
American Robin	c	r	c	c
Gray Catbird	c	r	c	r
Northern Mockingbird*	u	u	u	u
Brown Thrasher	c	c	c	c
American Pipit	r		r	u
Cedar Waxwing	c		r	c
Loggerhead Shrike*	c	c	c	c
European Starling	u	u	u	u
White-eyed Vireo*	a	a	a	r
Blue-headed Vireo	c		u	u
Yellow-throated Vireo*	c	c	u	
Red-eyed Vireo*	a	a	a	
Philadelphia Vireo	u		u	
Blue-winged Warbler	c		u	
Golden-winged Warbler	c		u	
Tennessee Warbler	c		u	
Orange-crowned Warbler	c		u	c
Northern Parula*	c	a	c	
Yellow Warbler	u		c	
Chestnut-sided Warbler	c		u	
Magnolia Warbler	c		u	
Yellow-rumped Warbler	c		u	a
Black-throated Green Warbler	c		u	
Blackburnian Warbler	c		u	
Yellow-throated Warbler*	c	c	c	
Pine Warbler	r		r	u
Prairie Warbler	u		u	
Palm Warbler	u		u	
Bay-breasted Warbler	c		u	

Common Name		*Spring March – May*	*Summer May–August*	*Fall Winter Sept-Nov*
Blackpoll Warbler	c		u	
Cerulean Warbler	u		u	
Black-and-White Warbler	c		c	
American Redstart*	c	u	c	
Prothonotary Warbler*	a	a	a	
Worm-eating Warbler	u		u	
Swainson's Warbler*	u	u	u	
Ovenbird	c		u	
Northern Waterthrush	c		u	
Louisiana Waterthrush	c		u	
Kentucky Warbler*	c	c	c	
Common Yellowthroat*	c	u	c	u
Hooded Warbler*	c	c	c	
Wilson's Warbler	u		u	
Canada Warbler	c		u	
Yellow-breasted Chat*	c	c	c	
Summer Tanager*	c	c	c	
Scarlet Tanager	c		u	
Northern Cardinal*	a	a	a	a
Rose-breasted Grosbeak	c		u	
Blue Grosbeak	c	u	c	
Indigo Bunting*	a	a	a	
Painted Bunting*	c	c	c	
Dickcissel*	c	c	c	
Rufous-sided Towhee*	c	c	c	c
Chipping Sparrow	u		u	r
Field Sparrow	u		u	u
Savannah Sparrow	c		u	c
Fox Sparrow	u		u	u
Song Sparrow	c		u	c
Swamp Sparrow	c		u	c
White-throated Sparrow	c		u	a
Dark-eyed Junco	c		u	c
Lapland Longspur				u
Bobolink	u			
Red-winged Blackbird*	a	a	a	a
Eastern Meadowlark*	c	c	c	c
Rusty Blackbird	u		u	u
Brewer's Blackbird	r		r	r
Common Grackle*	u	u	u	c
Brown-headed Cowbird*	a	a	a	a

Common Name		*Spring March – May*	*Summer May–August*	*Fall Winter Sept-Nov*
Orchard Oriole*	c	u	u	
Baltimore Oriole	c		u	
Purple Finch			u	u
House Finch	r	r	r	r
Pine Siskin				u
American Goldfinch	u		u	c
House Sparrow	r	r	r	r

Mammals

- Armadillo
- Bats- Southeastern myotis, Eastern pipistrelle, Big brown, red, Seminole, Hoary, Northern yellow, Evening, Rafinesque's big-eared, Brazilian free-tailed
- Beaver
- Bobcat
- Coyote
- Feral hogs
- Fox: Grey and red fox
- Long-tailed weasel
- Mink
- Mouse – House, deer, harvest
- Nutria
- Opposum
- Otter
- Raccoon
- Rats- wood, rice, cotton
- Shrew – short-tailed, least
- Squirrel: Grey, fox, flying
- Striped skunk
- Swamp and cotton-tailed rabbit
- White-tailed deer
- Woodland vole

Amphibians and Reptiles

- *Snakes:*
- Garter snakes
- Canebrake rattlesnake
- King snake
- Mud snakes
- Copperheads
- Cotton mouth moccasin
- Various water snakes

Frogs

- Bullfrog
- Eastern narrow-mouthed toad
- Gray treefrog
- Green frog
- Green treefrog
- King snake
- Mud snakes
- Northern cricket frog
- Rat snake
- Southern leopard frog
- Squirrel treefrog
- Stripped chorus frog
- Woodhouse's toad

- *Alligators*

Turtles

- Alligator snapping turtles
- Cooters
- Eastern box turtles
- False map turtle
- Mississippi map turtle
- Musk turtle
- Painted turtles
- Slider
- Snapping turtles
- Spiny softshells
- Stinkpot

Lizards

- Borad-headed skinks
- Eastern fence lizards
- Five-lined skinks
- Green anoles
- Ground skinks

Mussels

- Fat pocketbook
- Flat floater
- Giant floater
- Mapleleaf
- Paper pondshell
- Papershell
- Pink papershell
- Pond mussel
- Southern mapleleaf
- Texas liliput
- Yellow sandshell

Fish		
Order/Family	*Scientific Names*	*Common Names*
Centrarchidae/Sunfish	Lepomis auritus	Redbreast sunfish
	Lepomis macrochirus	Bluegill
	Lepomis punctatus	Spotted sunfish
	Lepomis microlophus	Redear
	Pomoxis annularis	White crappie
	Pomoxis nigromaculatus	Black crappie
Percichthyidae/Sunfish	Micropterus punctulatus	Spotted bass
	Micropterus salmoides	Large mouth bass
Sciaenidae/Drum	Aplodinotus grunniens	Freshwater drum
Ictaluridae/Catfish	Ameiurus catus	White catfish
	Ameiurus nebulosus	Brownhead
	Pylodictis olivaris	Flathead

Trees - Dominant Vegetation	Understory - Subdominant vegetation	Wet Sites
Black willow	Black berry	pickerel-weed
Cherry bark willow	Black locust	day lower
Cottonwood	Box elder	water hyacinth
Cypress	Button bush	various sedges
Drummond red maple	Deciduous holly	iris
Elms - winged, water, cedar	Dew berry	spider lily
Green ash	French mulberry	lizards tail
Gum - red, tupelo,	Haws (cretagus)	marsh mallow
Hackberry	Honey locust	cardinal flower
Oaks - overcup, Nuttall, Shumard, water, willow	Honey suckle	
	Hornbeam	
Pecans - Sweet and bitter	Palmetto	
Red mulberry	Prickly ash	
Swamp Cottonwood	Smilax	
Sweetgum	Swamp dogwood	
	Swamp privet	
	Switchcane	
	Vines - rattan, muscudine, poison ivy and oak, Virginia creeper, pepper vine, cross vine and grape	
	Water locust	

Appendix V
Decisions and Approvals

Intra-Service Section 7 Biological Evaluation

Originating Person: Jerome E. Ford, Michael D. Esters

Telephone Number: 318-336-7119 E-Mail: R4RW_LA.COC

Date: 8/18/99

PROJECT NAME: Bayou Cocodrie NWR Comprehensive Conservation Plan

I. Service Program: Refuges

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

III. Station Name: Bayou Cocodrie National Wildlife Refuge

IV. Description of Proposed Action: Implementation of the Comprehensive Conservation Plan for Bayou Cocodrie NWR by adopting the proposed alternative which will provide guidance, management direction, land protection and operation of the next 15 years.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map: Bald eagle are rarely seen. Louisiana black bear use the refuge as a travel corridor. American alligator occurs refuge wide in sloughs, small lakes and bayous.

B. Complete the following table:

SPECIES/CRITICAL HABITAT	STATUS[1]
Bald eagle	T
Louisiana black bear	T
American alligator	T

Status: E=endangered. T=threatened. PE=proposed endangered. PT=proposed threatened. CH=critical habitat. PCH=proposed critical habitat. C=candidate species.

VI. Location of the proposed action

A. Ecoregion: Lower Mississippi Valley

B. Parish and State: Concordia Parish, Louisiana

C. Section, township, and range (or latitude and longitude): T7N, T6N, R8E

D. Distance and direction to nearest town: Three miles southwest to Ferriday, LA.

E. Species/habitat occurrence:

Bald Eagle - Wintering bald eagles are rarely seen but occasionally observed near the s scenic river Bayou Cododrie.

Louisiana black bear - Utilize the refuge as a travel corridor between two known sub-populations.

American alligator - Alligators are common in the lakes, streams, sloughs, and bayous.

VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitats.

Species/Critical Habitat	Impacts to Species/Critical Habitat
Bald Eagle	No negative impacts foreseen, more protection
Louisiana black bear	No negative impacts foreseen, more protection
American alligator	No negative impacts foreseen, more protection

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

Species/Critical Habitat	Actions to Mitigate/Minimize Impacts
Bald Eagle	Maintain and expand potential roosting and feeding habitat
Louisiana black bear	Maintain and expand bottomland hardwood forest habitat
American alligator	Maintain and expand potential wetland habitat

VIII. Effect Determination and Response Requested:

SPECIES/CRITICAL HABITAT	DETERMINATION[2]			Response Requested
	NE	NA	AA	
Bald eagle		X		
Louisiana black bear		X		
American alligator		X		

DETERMINATION:

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, or 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, or 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, or candidate species or designated/proposed critical habitat. Response Requested for listed species is "Formal Consultation. Response requested for proposed and candidate species is "Conference".

Determination/Response Requested:

Jerome E. Ford — Signature
8/23/99 — Date
Refuge Manager — Title

David N. Frugé — Signature
8/31/99 — Date

Title
Office

Compatibility Determination

Introduction

This Compatibility Determination describes the wildlife-dependent recreation uses that may be included in the public use program under the preferred alternative and determines whether these uses are compatible with wildlife purposes.

Under the National Wildlife Refuge System Administration Act of 1966, the Refuge Recreation Act of 1962, and the National Wildlife Refuge System Improvement Act of 1997, the Service may not permit public recreational uses on a national wildlife refuge unless these uses are first determined to be compatible uses. The primary goal of all public use activities on this refuge would be to provide quality, compatible, wildlife-dependent recreational opportunities for visitors in a manner that does not negatively impact wildlife population levels or the natural diversity of the area. Wildlife-dependent recreational uses are encouraged on national wildlife refuges as long as they are compatible with refuge purposes.

Refuge Uses

This compatibility determination applies to: (1) Recreation hunting of big game (white-tailed deer and turkey), upland game (squirrel and rabbit), furbearers, and migratory birds in accordance with State of Louisiana regulations; (2) Recreational fishing of freshwater fish (bass, perch and catfish); (3) Wildlife observation and photography; (4) Environmental education and interpretation; (5) All-terrain vehicles use associated with wildlife-dependent recreational uses; and (6) Trapping of selected furbearers to achieve wildlife and habitat management objectives stated in the Draft Comprehensive Conservation Plan.

Refuge Name

Bayou Cocodrie National Wildlife Refuge

Date Established

November 6, 1990

Establishing and Acquisition Authority(ies)

Public Law 101-593 (Section 108 of H.R. 3338)

Refuge Purpose

The Public Law 101-593 (Section 108 of H.R. 3338) states that the refuge would be managed for the purposes of: (1) conservation and enhancement of wetlands; (2) management of migratory birds; and fish and wildlife recreation activities. In establishing the purpose, Congress recognized the significance of this refuge by stating, "...the Bayou Cocodrie area is a bottomland hardwood swamp which borders (supports or harbors) over one hundred and fifty species of birds and many other types of wildlife, including several species threatened with extinction, such as the Louisiana population of black bears. The Bayou Cocodrie area includes some of the least disturbed bottomland hardwood forest in the Southeast and significantly contributes to the biological diversity in the region.

Mission of the National Wildlife Refuge System

As set forth in the National Wildlife Refuge System Improvement Act of 1997, the mission of the National Wildlife Refuge System is: "...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

Description of Uses and Anticipated Biological Impacts

This compatibility determination relies on best estimates of current public use levels as provided by the Louisiana Department of Wildlife and Fisheries and the Fish and Wildlife Service. Information obtained by the refuge staff during the first year of refuge-administered public use activities is also incorporated. During subsequent years, the Service would continue, as indicated in the Draft Comprehensive Conservation Plan, to gather definitive public use data, conduct surveys to estimate wildlife populations, and assess public use impacts on the resources. If adverse impacts to refuge resources associated with public use activities are identified in future years, modifications to that part of the program in question would be implemented to minimize that impact.

The following is a description of the type and estimated level of wildlife-dependent recreation uses that are presently occurring on the refuge, their anticipated impacts, and a discussion of whether or not these current uses are compatible with refuge purposes. For additional details, see the Draft Comprehensive Conservation Plan and Environmental Assessment for Bayou Cocodrie National Wildlife Refuge.

Hunting

Most of the refuge area is a contiguous forest of mature bottomland hardwoods. There is a great variety of tree species on the refuge that includes oak, hackberry, black gum, hickory, elm, green ash, bitter pecan, cypress, tupelo, and willow. This rich forested wetland provides good habitat for a number of game species including white-tailed deer, turkey, squirrel, raccoon, and waterfowl.

Many of the local resident enjoy an informal, rural lifestyle that includes frequent recreational use of the area's natural resources. Hunting and fishing have been, and continue to be popular uses of refuge lands. Implementation of the preferred alternative, as described in the Draft Comprehensive Conservation Plan, would ensure that opportunities for various types of wildlife-dependent recreation would continue for future generations.

There are very few turkeys in the area and very little hunter effort directed toward this species. However, a dramatic increase in the turkey population would be expected with the implementation of the preferred alternative. Until the turkey population reaches sufficient levels, turkey hunting would remain closed.

The flood plain hardwood forests of the area support high squirrel populations and have for several years. As a result, fall squirrel hunting is one of the most popular activities on the refuge. Squirrel dogs are occasionally used in late winter following leaf fall.

The racoon population appears to be very high throughout the area, and in the absence of predators, racoon populations rapidly build to levels resulting in disease problems and impacts to the reproduction of non-game forest breeding birds and wild turkeys. Therefore, in addition to providing hunting opportunities, and effective harvest for racoon is particularly important to control their population level.

Harvest management for big game (white-tailed deer and turkey) is the art of combining wildlife science and landowner objectives for the attainment of a specific management goal. Harvest management strategies should be based on objectives established as part of hunting plans developed for the area. The objective-setting process must be based on a complete analysis of biological data. Specific objectives allow the setting of hunting

regulations. Results of each hunting season would be evaluated thoroughly so the harvest management program remains dynamic and responsive to an evolving management environment (Bookhout 1994).

Harvest management for upland game and furbearers (squirrel, rabbit, raccoon, opossum, beaver) is considerably different from that of both big game and migratory girds. Current literature suggests that user take (<50% of total mortality) of most upland game is compensatory; that factors such as immigration from adjacent areas and density-dependent production operate in most upland game populations; and that hunting does not significantly impact populations. Hunting is substituted for natural mortality. Production of large, annual surpluses of young allows for lengthy seasons and generous bag limits with little concern for over-harvest and minimal chance of population impacts in most areas (Bookhout 1994).

Harvest management for migratory birds (ducks, woodcock) is more difficult to assess. Migratory bird regulations are established at the federal level each year following a series of meetings involving both federal and state biologists. Harvest guidelines are based on population survey data with regulations that are subject to change each year, including bag limits, season lengths, and framework dates (Bookhout 1994).

The refuge's great variety and abundance of high quality wetland areas provide outstanding habitat for a variety of wading birds. Wading birds frequent these wetlands and four known rookeries are present on the property. Primary species include the great blue heron, little blue heron, green heron, cattle egret, snowy egret, great egret, anhinga, and night herons (Fish and Wildlife Service 1999). The potential of disturbance, especially during the nesting season, does exist for these rookeries; however, this potential would be virtually nonexistent due to no overlap of hunting seasons with nesting season.

Similar to wading birds, the area's habitat for neotropical migratory birds is outstanding (Fish and Wildlife Service 1992). Neotropical migrants use the interior hardwood forested areas and edges. Disturbance to neotropicals would be minimal and temporary as the habitat would be slightly altered for the betterment of these species.

Based on available information, no threatened or endangered species, other than the Louisiana black bear, have been documented on the area that is now Bayou Cocodrie National Wildlife Refuge. It is anticipated that the current levels and expected future levels of hunting or other wildlife-dependent recreation activities would not directly, indirectly, or cumulatively impact any listed, proposed, or candidate species or designated/proposed critical habitat. Data gathered from future biological surveys regarding the presence or potential importance of the refuge to threatened or endangered species or critical habitat (or proposed threatened, endangered or critical habitat), could result in changes to public use activities across time; however, these changes would have no effect on listed species.

Incidental take of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At current and anticipated public use levels for this program, this incidental take would be very small and would not directly or cumulatively impact current or future population levels of other wildlife species either on this refuge or in the surrounding area. Implementation of an effective law enforcement program and development of site specific refuge regulations/special conditions for these uses would eliminate most incidental take problems.

The refuge hunter visits have consistently been near 5,000/year. This probably reflects an increase in use because this area was hunted by private hunting parties prior to the refuge establishment. The harvest information annual averages for species taken from 1994 through 1999 are as follows: nearly 230 white-tailed deer, 2,000 squirrels, 100 rabbits, 20 feral hogs, and 5 raccoons.

Current levels and anticipated future levels of hunting are considered to be compatible with the purpose for which the refuge was established.

Fishing

Sport fishing is perhaps the most common public use surrounding the refuge. The two refuge lakes (Wallace Lake and Little Wallace Lake) offers very limited opportunities for sport fishing. Historically these lakes have contained large mouth bass, crappie and catfish. Currently access to these remote lakes are virtually nonexistent thereby nullifying all public use. However, the scenic river Bayou Cocodrie which meanders through the refuge provides a variety of fish species that include bass, crappie, gaspergou, bream, buffalo, and catfish. As identified in the Draft Comprehensive Conservation Plan additional access will be provided, creel surveys conducted, and water quality analysis performed in order to provide a high quality fishing experience.

Recreational fishing should not have any adverse impacts on either the fisheries resource, wildlife resource, endangered species, or other natural resources on the refuge. There may be some limited disturbance to certain species of wildlife and some trampling of vegetation; however, this should be short-lived and relatively minor and would not negatively impact the wetland values of the refuge. Known bird rookery sites do not occur at locations currently popular for fishing activities, therefore, disturbance should not be a problem. If disturbance at these sites is identified as a problem in future years, closed areas would be established during nesting season to eliminate this concern. Problems associated with littering and illegal take of fish would be controlled through law enforcement activities.

The public is a strong advocate of fishing in the area. Allowing the public to continue to fish on the refuge would have a positive effect on public opinion and would help build support for the Service and for natural resource issues. Providing fishing opportunities would also allow the use of a renewable natural resource without adversely impacting other resource values.

The estimated current level and the anticipated future level of fishing is considered to be compatible with the purpose for which the refuge was established.

Wildlife Observation/Photography/Environmental Education/Interpretation

Nonconsumptive uses such as birdwatching, hiking, nature photography, and picnicking are minimal at this time due to the area's distance from large metropolitan areas and the general lack of access. It is estimated that 2,000 visits/year are totaled for wildlife observation and related activities. However, the majority of public use visits to the refuge is associated with hunting.

It is anticipated that an increase in nonconsumptive wildlife-dependent use would occur over the next few years as facilities are provided and the public and conservation groups become aware of the excellent birding opportunities. This anticipated increase would be slow in developing, however, and because of the remoteness of the area, high numbers of users are not expected.

Although a few refuge visitors have inquired about canoeing opportunities, no canoeists have been observed using Bayou Cocodrie. This may be a direct result of a lack of access to this watercourse. Canoeing is likely to be an infrequent activity at best on refuge waters. However, the scenic river Bayou Cocodrie meanders the refuge from north to south and would provide an excellent canoe trail during certain times of the year.

Wildlife observation/photography activities might result in some disturbance to wildlife, especially if visitors venture too close to one of the bird rookeries. Refuge road systems and all-terrain vehicle trails opened to public use would be routed to minimize disturbance that might occur to these sensitive areas. If unacceptable levels of disturbance is identified at any time in future years, rookery sites would be closed to public entry during nesting season. Some minimal trampling of vegetation also may occur.

Environmental education/interpretation activities have been nonexistent in pror years. Refuge efforts to develop this program would be forthcoming and would usually be associated with structured activities conducted by refuge staff or trained volunteers. Disturbance from environmental education activities is expected to be minimal and to have an insignificant effect on refuge resources, including fish and wildlife and their habitats and wetland values.

The current and anticipated future levels of wildlife observation, photography, and environmental education and interpretation activities are compatible with the purpose for which the refuge was established.

All-Terrain Vehicle Use

A large portion of the refuge is inaccessible to conventional vehicles due to either impassible roads or no roads. In order to disperse hunters and access remote areas for hunting, refuge users have historically utilized all-terrain vehicles throughout the area resulting in a "maze" of trails to virtually every possible location. Uncontrolled off-road vehicle use has impacted the area in that severe rutting has occurred throughout the area, disturbance to wildlife is perhaps very high, and disturbance to refuge users very high.

Considering the topography of the area and its remoteness, the need for limited use of all-terrain vehicles by certain refuge users is apparent. It would be impossible to develop an effective public use program that provides optimum consumptive use opportunities without providing for all-terrain vehicle use.

Service policy pertaining to all-terrain vehicle use requires such use be in conjunction with wildlife-dependent activities only, and be confined to designated areas or trails identified for such use; all off-road use is restricted to foot travel only. Approximately 13 miles of trails were designated for public use by signs and colored markers. Some modifications to this initial trail system would be necessary across time as a refuge public use patterns change and/or other public use development occur. With these regulations in place, all-terrain vehicle use on the refuge in support of wildlife-dependent activities is compatible with the purposes for which this refuge was established.

Trapping of Selected Furbearers

Racoon and beaver are the species towards which management activities may be directed. Both species are at a sufficiently high level on the refuge to adversely affect ecosystem function. As indicated in the Draft Comprehensive Conservation Plan, beaver activities have caused significant deterioration and loss of bottomland hardwoods throughout the refuge, and excessive numbers of racoons can have negative effects on the reproduction of forest breeding birds and wild turkeys. Protection

and restoration of bottomland hardwoods and improvements in game and nongame populations is a central component of the plan. To this end, trapping and/or hunting (as indicated earlier) remain the only viable methods to reduce population levels of beaver and racoon.

The Service would use contracts (Special Use Permits) to administer a trapping program consistent with sound biology, refuge purposes, and conservation of ecosystem function. This program would mandate accurate reports of the number of beaver and racoon taken, which would enable refuge staff to assess the impacts of the program on wildlife. No trapping program, regardless of how well it is designed, can prevent the possible take of other species. Trappers would be required to report the incidental take of other species. A negligible impact on other wildlife species is expected in both the short and long term. As a trapping program is implemented on the refuge, it would be closely monitored to assess the potential adverse effects on other wildlife as well as the benefits to game and nongame species and their habitats. Modifications to the program would be implemented as needed to maintain compatibility. The implementation of a trapping program under controlled conditions provides and essential population control management tool and is compatible with the purposes of the refuge.

Stipulation Necessary to Ensure Compatibility

Wildlife-dependent recreation uses, uses supporting wildlife-dependent uses, and trapping of selected furbearers would be permitted on Bayou Cocodrie National Wildlife Refuge in accordance with the following exceptions:

Fishing and hunting would be permitted in accordance with State of Louisiana regulations and licensing requirements.

Vehicles would be restricted to existing roads. No vehicles may be operated where no improved surface roads exist. All-terrain vehicles would be restricted to designated trails/road Off-road travel would be limited to foot travel only. Use of horses would be restricted to designated roads and trails and allowed only in conjunction with specially permitted wildlife-dependent activities.

Firearms, bows and other weapons would be prohibited except during designated hunting seasons.

Hunting deer with dogs would not be allowed on the refuge. Use of dogs for hunting rabbit, squirrel, racoon, feral hogs and woodcock will be allowed during designed seasons only. Other dogs and pets must be confined or on a leash.

Camping overnight on the refuge would be prohibited.

All hunts would be designed to provide quality user opportunities based upon known wildlife population levels and biological parameters. Hunt season dates and bag limits would be adjusted as needed to achieve balanced wildlife population levels within carrying capacities, regardless of impacts to user opportunities.

As additional data is collected and a long-range hunt plan developed, additional refuge-specific regulations could be implemented. These regulations could include, but may not be limited to, season dates that differ from those on the surrounding state zones, refuge permit reqduirements, and closed areas on a permanent or seasonal basis (to reduce disturbance to specific wildlife species or habitats, such as bird rookeries, wintering waterfowl or threatened/endangered species, or to provide for public safety).

Trapping would be permitted in accordance with State of Louisiana regulations and licensing requirements. A refuge special use permit would be required for trapping which contains conditions designed to meet wildlife populations goals and requires, among other things, careful harvest reporting.

National Environmental Policy Act Compliance

Development of a public use program that provides optimum opportunities for wildlife-dependent recreational uses, provision of all-terrain vehicles and trapping programs focus on selected furbearers would, as evaluated in this compatibility determination, have negligible impacts on refuge resources. Allowing these uses to continue is not expected to be controversial regarding the impacts on refuge resources. Therefore, this action is categorically excluded from National Environmental Policy Act (516 DM6 Appendix 1 B(5)).

In assessing the potential impacts of proposed refuge uses, all available tools were utilized (Fish and Wildlife Service 1986). A site-specific document (Final Environmental Assessment and Land Protection Plan for Proposed Establishment of Bayou Cocodrie National Wildlife Refuge), site-specific personal communications (Louisiana Department of Wildlife and Fisheries), data collection from 1994-1999, the development of the Draft Comprehensive Conservation Plan and Environmental Assessment, and general references are considered to be sufficient to make this compatibility determination.

As stated previously, Bayou Cocodrie National Wildlife Refuge is a new refuge and much of the data available covers only a 5-year period. As the refuge public use program is developed and fully implemented, refuge staff would continue to assess the public use programs and any possible impacts to refuge resources/wildlife populations. Changes in the program would be implemented as needed to address any impacts identified and to respond to anticipated wildlife population changes due to implementation of state-of-the-art wildlife management activities.

Determination

Based on available information, the proposed hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation, all-terrain vehicle use and trapping uses occurring within the refuge are compatible with the purpose for which the refuge was established.

There has been substantial historical use of this forested wetland area for hunting, fishing, and trapping. Based on available information, there is no indication of long-term adverse biological impacts associated with these activities. Allowing these uses to continue is consistent with these objectives and follows current Service policy.

There are a number of situations where future refuge closures or restrictions could be warranted. Examples of these situations include, but are not limited to, protection of endangered species (flora or fauna); protection of colonial bird rookeries; establishment of sanctuary areas for waterfowl; establishment of hunter quota systems to provide for a high quality hunting experience or to achieve specific wildlife population objectives; conflicts with other refuge management programs; and, lack of funds to administer hunts.

Justification

The National Wildlife Refuge System Improvement Act of 1997 identifies compatible wildlife-dependent recreational uses as legitimate and appropriate uses of the National Wildlife Refuge System. The Act further recognizes hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation as the priority general public uses of the National Wildlife Refuge System.

As described earlier, the purpose of this refuge is to conserve the valuable bottomland hardwood wetlands, perpetuate migratory birds, and provide, to the maximum extent practicable, compatible wildlife-related public uses as evaluated in this determination.

Thus, hunting and fishing are compatible with the refuge's purpose and meet one on the refuge's objectives to provide for compatible wildlife-dependent recreation. Providing a public use program that allows quality user opportunities, including hunting and fishing, follows current Service policy to expand and enhance opportunities for high quality hunting and fishing on refuges. Allowing hunting and fishing to continue also helps to maintain and build support for the Service and other wildlife conservation efforts.

Nonconsumptive wildlife-dependent uses (wildlife observation, photography, and environmental education and interpretation) are compatible with the refuge's purpose and meet one of the refuge's objectives to provide for compatible wildlife-dependent recreation. Allowing these uses to continue follows current Service policy to provide for compatible wildlife-dependent recreation. Allowing thee nonconsumptive recreational opportunities to continue helps to maintain and build public support for the Service and its wildlife conservation efforts.

All-terrain vehicle use, while not a wildlife-dependent use, is an essential use that provide wildlife-dependent recreational opportunities, and are judged to be compatible with the purpose of the refuge. Implementation of the stipulations mentioned above would assure continued compatibility. If the need for these supporting uses increases, the refuge staff would carefully evaluate these actions prior to their implementation and monitor their effects.

Trapping of selected furbearers is essential to the protection and restoration of bottomland hardwood wetlands and ultimate increases of game and nongame wildlife species on the refuge. Therefore, trapping is considered a compatible use.

Signature

Refuge Manager:_____

Date:_____

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Louisiana Department of Wildlife and Fisheries. 1997 and 1999. Personal communication.
District IV Biologists Reginald Wycoff and John Lincecum, Law Enforcement Captain
Charles Tarver.

Appendix VI.
Management Methods and Procedures

Partnerships

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

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

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

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

Typical restoration projects may include, but are not limited to:
- Restoring wetland hydrology by plugging drainage ditches, breaking tile drainage systems, installing water control structures, dike construction, and re-establishing old connections with waterways.
- Installing fencing and off-stream livestock watering facilities to allow for restoration of stream and riparian areas.
- Removal of exotic plants and animals which compete with native fish and wildlife and alter their natural habitats.
- Prescribed burning as a method of removing exotic species and to restore natural disturbance regimes necessary for some species survival.
- Reconstruction of in-stream aquatic habitat through bioengineering techniques.

In addition to providing restoration assistance to private landowners, the Service also provides biological technical assistance to U.S. Department of Agriculture agencies implementing key conservation programs of the Farm Bill. The Service's assistance helps the Department of Agriculture meet the technical challenges presented by these programs while maximizing benefits to fish and wildlife resources. The Service also assists in on-the-ground habitat restoration actions associated with several of these programs.

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

The Service provides technical assistance to the Farm Service Agency's Farm Credit Programs in the implementation of three important conservation programs. Two of these programs involve conservation measures related to disposal of inventory farm property obtained through loan failure. The Service reviews these inventory properties and makes recommendations for: (1) the establishment of perpetual conservation easements for protection and restoration of wetlands and the conservation of other important natural resources; and (2) the fee title transfer of inventory properties to state or federal agencies for conservation purposes.

The third area in which the Service provides technical assistance involves property owned by Farm Service Agency borrowers. The Fish and Wildlife Service assists in evaluating natural resource values of property securing Farm Service Agency loans and makes recommendations for establishment of conservation contracts where borrowers voluntarily set aside the lands for conservation in exchange for partial debt cancellation. The Fish and Wildlife Service is the primary manager of inventory easements, and receives approximately 40 percent of the fee title transfers. These lands become part of the National Wildlife Refuge System. In addition, the Service restores wetlands and other important habitats on Farm Service Agency easements and transfer properties.

Some of the more widely used government conservation partnership programs in central Louisiana are listed in Figure 26.

Avifaunal Analysis

The goal for forest breeding birds in the Lower Mississippi Valley was to establish self-sustaining populations for all of the roughly 70 species that breed in the valley. Although habitat objectives must ultimately address both quality and quantity, the Service initially concentrated on the size and number of forest patches in this highly fragmented landscape. A 6-step process was established to set habitat objectives and population goals. The Partners-in-Flight prioritization process (Hunter et al., 1993) was utilized to set breeding bird species priorities in the valley. Six of the seven highest priority species breeding in the valley nest in bottomland hardwood forests. Based on this and the historical ecosystem structure of the valley, bottomland hardwood forests were selected as the highest priority habitat type for breeding bird conservation. To determine forest patch sizes, two sources of information were used: empirical studies and a mathematically derived theoretical genetically viable population. Empirical studies were used primarily for the swallow-tailed kite and the Cerulean warbler.

Figure 26. Private Lands Conservation Information

Program Title	*Management Action*	*Benefits to Landowner*	*Contact Information*
Partners for Wildlife	Management for Wildlife and Timber	Technical Assistance	Fish & Wildlife Service Bayou Cocodrie National Wildlife Refuge
	Reforestation on Cropland and Forest Land	Technical Assistance, up to 100 percent cost share	PO Box 1772 Ferriday, LA 71334
Wetlands Reserve Program	Reforestation on Cropland and Forest Land	Easement purchase and restoration cost-share	Natural Resource Conservation Service 8331 Highway 84
	Marsh Restoration	Easement purchase and 75 percent restoration cost-share	Ferriday, LA 71334
Conservation Reserve Program	Management for Wildlife and Timber	Annual rental payment, 50 percent cost-share	Farm Services Agency PO Box 686 Ferriday, LA 71334-0686
	Reforestation on Cropland and Forest Land	Rental payment and 50 percent cost-share	
	Marsh Protection	Rental payment and 50 percent cost-share	
	Cropland Management for Waterfowl or Other Wildlife	Rental payment and 50 percentcost-share	
Louisiana Natural Areas Registry Program	Existing Forest Land Protection	Management plan development, tax incentives	Lousiana Department of Wildlife Fisheries, District IV PO Box 426 Ferriday, LA 71334-0426 The Nature Conservancy PO Box 4125 Baton Rouge, LA 70821
Technical Assistance	Management for Wildlife and Timber	Information source, technical assistance	Lousiana DWF, District IV PO Box 426 Ferriday, LA 71334-0426
	Marsh Protection and Restoration	Information source, technical assistance	
	Marsh Management Assistance Program	Technical assistance, signs for posting	
	Cropland Management for Waterfowl or Other Wildlife	Information	
Louisiana Waterfowl Project	Cropland Management for Water	Technical assistance and free water control structures	Ducks Unlimited

To determine the forest patch size requirements for the theoretical genetically viable populations the following formula was used:

A = (N c D) + B

A = Area of forest patch required to support a source population
N = number reproductive units (usually breeding pairs) required for a source population
D = Breeding density (usually expressed as hectares/breeding pair)
B = The area of a one kilometer forested buffer around the forest core (N*D).

For each of several populations, the Service adopted a proposed minimum effective population size of 500 breeding adults in the recovery plan for the Red-cockaded woodpecker. For monogamous species this constitutes 250 breeding pairs. However, establishing conservation goals at the minimum threshold seems fraught with peril. Thus, to buffer breeding populations within forest patches, a goal of 500 breeding pairs per forest patch (N=500) was adopted.

For the value of D, average breeding densities from Breeding Bird Censuses conducted in the Southeastern United States was used. Even under optimal conditions, bird density in bottomland hardwoods is determined by the frequency of occurrence of patchily distributed micro-habitat features (e.g., thickets for Swainson's warblers, cypress brakes for yellow-throated warblers, etc.). To account for these habitat quality factors, it was assumed that birds rarely occur in the valley at densities as high as reported in the literature, which is an additional reason for the adoption of 500 breeding pairs per forest patch as a target population.

The agricultural matrix that dominates the valley is generally considered hostile to birds breeding within forest patches. Researchers working in fragmented landscapes have found that nest predation and parasitism were high even in large forest patches (5,000 acres) in landscapes with a low percentage of forest cover. They also have found that female Brown-headed cowbirds travel an average of 2 miles between feeding and breeding sites. One researcher has found that male Ovenbirds singing on territories less than 900 feet from the edge of the forest were more likely to be unpaired than males from the interior of the forest. For planning purposes, it is assumed that a 0.6-mile forest buffer surrounding an interior forest core will reduce these negative impacts. Only those pairs within the forest core are assumed to reproduce at a rate sufficient to serve as a source population. Because the area of a 0.6-mile buffer will vary with the geometric configuration of each forest patch, the area requirements of each will differ. For planning purposes, until the actual areas of interior forest within each forest patch are determined, doubling the core forest area (B=2) will generally result in forest patch requirements that approximate or exceed a 0.6-mile buffer around the desired interior forest area.

As an example, Swainson's warblers have been noted to occur at densities generally ranging of one pair per 6 to 11 acres. Taking the average of one pair per 9 acres, if Swainson's warblers occur over a large area at this density, 500 pairs would require 4500 acres. Applying the doubling

factor as a surrogate for the 0.6-mile buffer produces a desired forest patch size of 9,000 acres. The Service made this calculation for all valley forest breeding species. For planning purposes, the Service placed species into 3 forest patch size groups designed to meet their specific area requirements: 10,000-20,000, 20,000-100,000, and >100,000 acres.

Having determined the aerial habitat requirements of the high priority species and measured the existing habitat using 1992 thematic mapper images, specific locations across the valley were identified for habitat protection/restoration. In addition to habitat requirements and existing forest locations, several other factors such as flooding frequency, current land use, adjacent land use, ownership, and reforestation potential were used to identify proposed habitat protection/restoration sites. Where possible, restoration sites were centered on existing public land. Where linkages could logically be created, existing forest patches were combined to reach target sizes. This sometimes resulted in several existing 10,000- or 20,000-acre patches being combined into a proposed 100,000-acre patch.

Ultimately 101 proposed Breeding Bird Forest Patches were identified for the valley, but the number and location of these sites are not final, and probably never will be. A massive reforestation effort will be necessary to meet these objectives and their achievement often will be opportunity driven. As new opportunities arise and old objectives become unattainable, the locations of the Breeding Bird Forest Patches will change.

For Bayou Cocodrie National Wildlife Refuge, specifically, present data suggest densities for Swainson's warblers are now about 6/100 acres in optimal habitat and that this figure is lower than found at Tensas and Atchafalaya National Wildlife Refuges in comparable habitat (Ouchley unpubl. data, pers. observ.). To support 500 pairs, assuming all acreage is suitable or optimal habitat, about 8500 acres (without the buffer included) will be needed. However, as stated above it is risky to accept the assumption that all habitat is suitable or optimal for any priority species within a discrete habitat patch. A better assumption is that no more than half of all forested acreage is optimal or suitable (e.g., ridges, within a ridge and swale topography) for this species and therefore 17,000 acres (with buffer included) may be necessary to support the population target of 500 pairs. This acreage requirement is well above that suggested for this species elsewhere in the valley, but where there are already larger existing forest patches Swainson's warblers occur in higher densities.

The potential for establishing an acreage target for Bayou Cocodrie National Wildlife Refuge at 20,000 acres or more of bottomland hardwoods would be made in the hope that eventually Cerulean warblers and some swallow-tailed kites may re-colonize the area. As efforts continue to expand forested acreage, increasing densities from 6 to 9 pairs/100 acres may be an appropriate population objective. Reproductive data collection should also be undertaken to measure whether nesting success and fledgling survival changes accordingly for this and other species on the above list.

Food is assumed to be the limiting factor for both southbound migrating shorebirds and wintering waterfowl. Following this assumption, the amount of energy required to support one bird for one day, the length of each bird's stay in the valley (wintering or transient), was calculated along with the amount of energy available from potential food sources.

$$H = \frac{P \times S \times E}{C \times F}$$

H = Amount of habitat (hectares)
P = Population goal (number of birds)
S = Length of stay in the Lower Mississippi Valley (days)
E = Energetic requirement of one bird for one day (kilojoules [kj])
K = Energetic value of food source (kj/gram)
F = Available food (grams/ha)

With some adjustments, this formula was used to calculate the amount of habitat needed to support the target populations of shorebirds and waterfowl.

Transient Shorebirds

Typically, mudflat foraging habitat is abundant in the valley during the spring northward migration. In early spring the agricultural fields are bare and winter flood water is receding; in late spring rice fields are flooded. During southward migration, in late summer and fall, fields of maturing crops are dry. Therefore, the period from July 15 to September 30, is the period when foraging habitat for migrating shorebirds is least available. The objective is to ensure that adequate shallow water habitat is available in the valley to meet the foraging requirements of the species during their southward migration.

Neither census data nor any specific estimates of shorebird populations moving through the valley during southward migration currently exist. To establish such an estimate, we examined data from the International Shorebird Survey and consulted shorebird biologists (D.L. Helmers and B.A. Harrington) with knowledge of migration patterns and continental population estimates. Based on these sources, about 500,000 shorebirds are estimated to move through the valley during fall migration.

Shorebirds using the valley range in size from 30 to 200 grams (g). The average mass (weighted by abundance) is 45 g. A 45 g. shorebird requires 102.77 kilojoules (kj)/day to maintain its existence metabolic rate. For the purpose of modeling, we assumed that chironomids are the primary food item consumed by shorebirds. A gram of chironomids has a gross energy content of 23.8 kj. Because the assimilation efficiency of birds feeding on invertebrates is approximately 73 percent, the net energy content of chironomids in about 17.6 kj/g. Thus a 45 g. shorebird requires about 6 g./day (102.77/17.6 = 5.84) of invertebrate forage to maintain its body mass.

In addition, to provide the fat reserves necessary to complete migration, shorebirds must gain about one g./day. About 2 g. of invertebrate forage must be consumed each day to increase biomass by 1 g. The daily food requirement then becomes about 8 g.

We used estimates of 2 g./square meter for invertebrate food density and a 10-day stopover period for each shorebird migrating south through the Lower Mississippi Valley (D.L. Helmers, pers. comm.). The overall habitat objective for shorebird foraging habitat during southward migration is 5,000 acres. The 5,000-acre goal was distributed among valley states based on their ability to provide managed mudflat habitat during the fall migration period.

For Bayou Cocodrie National Wildlife Refuge, specifically, present and projected future refuge capabilities suggest that habitat should be provided to support about 12,000 southbound shorebirds.

Wintering Waterfowl

The valley-wide goal for waterfowl is to provide enough habitat to support 4.3 million wintering ducks and 1.0 million wintering geese. The duck goal was derived from goals of the North American Waterfowl Management Plan by determining the proportion of the continental wintering population found in the valley and then multiplying the continental breeding population goal by this proportion. Duck population levels from the 1970s were used as the basis for this goal because those levels are believed to be high enough to maintain huntable populations yet attainable in today's social and economic environment. The goose population goal was derived from the number of geese observed in the valley during the mid-winter waterfowl inventories in the mid-1980s, a period when most goose populations in the Mississippi Flyway were at or near historic high levels.

As with shorebirds, it is assumed that food is the limiting factor on wintering populations. The energy value and availability of various foods (soybean, rice, corn, moist soil, and bottomland hardwood forest) were calculated, and the daily energy requirement of a female mallard (292 kilocalories/day) was used. The wintering period for waterfowl is 120 days.

Approximately 650,000 acres of foraging habitat and an additional 625,000 acres of naturally flooded habitat are needed to support the wintering waterfowl population goal. Within each state habitat objectives are divided between public and private ownership, managed and unmanaged lands, and three foraging habitats: bottomland hardwood forests, moist soil, and agricultural fields. The availability of waterfowl foraging habitat depends on adequate precipitation and the resultant ponding or overbank flooding, and water control infrastructure (levees, dikes, water control structures, pumps) to facilitate flooding.

Archaeological and Historic Resource Protection

With the enactment of the Antiquities Act of 1906, the Federal Government recognized the importance of cultural resources to the national identity and sought to protect archaeological sites and historic structures on those lands either owned, managed, or controlled by the United States. The body of historic preservation laws has grown dramatically since 1906. Several themes are consistently present in the laws and the promulgating regulations. They include: 1) each agency to systematically inventory the "historic sites" on their holdings and to scientifically assess each site's eligibility for the National Register of Historic Places; 2) consideration of impacts to cultural resources during the agency's management activities and seek to avoid or mitigate adverse impacts; 3) protection of cultural resources from looting and vandalism to be accomplished through a mix of informed management, law enforcement efforts, and public education; and 4) the increasing role of consultation with groups, such as Native American tribes and African American communities, to address how a project or management activity may impact specific archaeological sites and landscapes deemed important to those groups. The objectives and strategies below outline the Service's attempt to achieve mandated historic preservation responsibilities in a manner consistent with its mission and the refuge's mission.

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

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

Ecosystem Management

Healthy habitats are necessary to sustain fish, wildlife, and plants on lands in the system. In the past, the administrative boundaries of national wildlife refuges have often bounded the scope of planning and policy decisions. The Service develops conservation strategies at two spatial levels in a collaborative process to solve broad scale ecological problems. Within a large spatial level, the Service has developed a cross-program approach for the Lower Mississippi Valley considering issues within the ecological, political, and social boundaries. The Lower Mississippi River Ecosystem Team focuses on landscape problems affecting fish and wildlife resources and provides specific guidance that will best serve trust species and species of concern and reduce impacts associated with forest fragmentation. At a smaller spatial level, the comprehensive conservation planning team reflects the conservation strategies for national wildlife refuges within the ecosystem and identifies select area species on which to focus management efforts.

Ecosystems are communities of living organisms interacting among themselves and with the physical component of their environment. Ecosystems are experiencing increasing impacts from human activities, the threat of which will require extraordinary flexibility and innovation to successfully conserve and manage them. In recent years conservationists have fostered the idea that resource conservation can best be achieved by taking a holistic approach to management. The Service is working with divergent interests on ecosystem-based approaches to conserve the variety of life and its processes in the Nation's diverse ecosystem.

The Service's mission is to conserve, protect, and enhance the Nation's fish and wildlife and their habitats for the continuing benefit of the American people. The Service has adopted an ecosystem approach to more effectively achieve this mission. Our objective is to implement consistent policies and procedures that will embrace the ecosystem approach in a "management environment" which considers the needs of all our resources in decision making. This holistic approach to fish and wildlife conservation will enable the Service to more efficiently and effectively maintain healthy ecosystems on a long-term basis and to conserve the Nation's rich biological heritage.

An ecosystem approach to fish and wildlife conservation means protecting or restoring the function, structure, and species composition of an ecosystem while providing for its sustainable socioeconomic use. It involves recognizing that, in some way, all things are connected. The ecosystem approach emphasizes conservation and management of discrete land units, watersheds, or ecosystems and requires the identification of ecosystem goals that represent resource priorities on which all programs of the Service will collectively focus their efforts. The Service must work closely and consistently with external partners, public and private, who share responsibility for ecosystem health and biological diversity. This approach will enable the Service to fulfill its fish and wildlife trust responsibilities with greater efficiency and effectiveness.

In the Southeast Region, we are approaching our nationally mandated leadership role for fish and wildlife conservation on an ecosystem basis, partnering with other Service regions, with other Federal agencies, with Sates and their local governments and citizenry, and with non-governmental organizations. Together, we are working to achieve healthy, sustainable ecosystems that ensure a continuing legacy of abundant fish and wildlife resources for all Americans to use and enjoy.

Land Protection and Conservation

The Service acquires land and interests in lands, such as easements and management rights in lands, through leases or cooperative agreements consistent with legislation or other Congressional guidelines and Executive Orders, for the conservation of fish and wildlife and to provide wildlife-oriented public use for educational and recreational purposes. These lands include national wildlife refuges, national fish hatcheries, research facilities, and other areas. The Service's policy is to acquire land from willing sellers, and only when other protective means, such as local zoning restrictions or regulations, are not appropriate, available or effective. When land is needed to achieve fish and wildlife conservation objectives, the Service seeks to acquire the minimum interest necessary to reach those objectives. If fee title is required, the Service gives full consideration to extended use reservations, exchanges, or other alternatives that will lessen the impact on the owner and the community. Donations of desired lands or interests are encouraged.

The Service, like all federal agencies, has the power of eminent domain, which allows the use of condemnation to acquire lands and interest in lands for the public good. This power, however, requires congressional approval and is seldom used. The Service usually acquires lands from willing sellers. In all fee title acquisition cases, the Service is required by law to offer 100 percent of the property's appraised market value, as set out in an approved appraisal that meets professional standards and federal requirements.

Planning for the acquisition of land, water, or other interests is initiated with the identification of a need to meet resource objectives that require a real property base. At Bayou Cocodrie National Wildlife Refuge, a team of biologists, planners, and realty specialists evaluated a myriad of factors, such as fish and wildlife resources, land use, threats to resource values, socioeconomic considerations, and cultural resources, to determine the original refuge boundary in 1990. This draft plan proposes to protect additional habitat from 22,269 acres to 42,269 acres. The acquisition of lands adjacent to Service-owned lands within the existing refuge boundary and larger contiguous forest tracts (inside or outside the current acquisition boundary), would be given the highest priority.

The recommendations in the Draft Comprehensive Conservation Plan provided to decision makers on the expansion of the refuge boundary define important and sensitive areas that could be protected and managed as part of the refuge system. The plan proposal is eventually forwarded to the Director of the Fish and Wildlife Service for approval. During the review of the draft plan, the public will have an opportunity to respond by attending public open houses, or directing comments to the Refuge Manager before the final plan is approved.

Once the expanded refuge boundary is approved and funds are available, the Service proceeds to contact all landowners within the boundary to determine if they are interested in selling their land. If the landowner expresses an interest in selling to the Service, a professional real estate appraiser will conduct an appraisal to determine the fair market value of the property. Once the value is determined, a meeting is held with the landowner and the Service presents its offer. If the landowner agrees with the offer, the purchase agreement is signed and the process of acquiring the land is set in motion.

Generally, the Service seeks to acquire the minimum interest necessary in the land to provide the level of protection needed to achieve management goals and needs. Other options may be available on a particular project such as conservation easements, leases, cooperative agreements or life-use reservations. In the latter, the owner reserves the right to live on and use part of the property for the remainder of his/her life. Owners sometimes choose to donate all or a portion of their land because of tax advantages or as a lasting memorial.

The acquisition methods that could be used by the Service under this alternative are described as follows:

1. Leases and Cooperative Agreements

Potentially, the Service can protect and manage habitat through leases and cooperative agreements. Management control on privately owned lands could be obtained by entering into long-term renewable leases or cooperative agreements with the landowners. Short-term leases can be used to protect or manage habitat until more secure land protection can be negotiated.

2. Conservation Easements

Conservation easements give the Service the opportunity to manage lands for their fish and wildlife habitat values. Such management precludes all other uses that are incompatible with the Service's management objectives. Only land uses that would have minimal or no conflicts with the management objectives are retained by the landowner. In effect, the landowner transfers certain development rights to the Service for management purposes as specified in the easement. Easements would likely be useful when: (a) most, but not all, of a private landowner's uses are compatible with the Service's management objectives, and (b) the current owner desires to retain ownership of the land and continue compatible uses under the terms set by the Service in the easement.

Land uses that are normally restricted under the terms of a conservation easement include:

(a) development rights (agricultural, residential, etc.); (b) alteration of the area's natural topography; (c) uses adversely affecting the area's floral and faunal communities; (d) private hunting and fishing leases; (e) excessive public access and use; and (f) alteration of the natural water regime.

3. Fee Title Acquisition

A fee title interest is normally acquired when (a) the area's fish and wildlife resources require permanent protection not otherwise assured; (b) land is needed for visitor use development; (c) a pending land use could adversely impact the area's resources, or (d) it is the most practical and economical way to assemble small tracts into a manageable unit.

Fee title acquisition conveys all ownership rights to the Federal Government and provides the best assurance of permanent resource protection. A fee title interest may be acquired by donation, exchange, transfer, or purchase.

Funds for the acquisition of lands for Bayou Cocodrie National Wildlife Refuge will likely come from the Land and Water Conservation Fund established by law. Sources of revenue for this fund include Federal Duck Stamp sales, refuge entrance fees, fish and wildlife fines, import taxes on arms and ammunition, offshore oil and gas leases, and Congressional appropriations.

Lands acquired by the Service would be removed from the tax rolls. To offset the fiscal impact associated with removal of these lands from the public tax rolls, the Refuge Revenue Sharing Act of 1935, as amended in 1978, provides for payments in lieu of taxes. Revenue sharing payments for the parish would compare favorably with current tax rates. If fully funded, the revenue sharing rate is 1 percent of the fair market value of a property. For lands purchased by the Service, the greatest of the following amounts is used to determine the annual payment amount to the parish. Payment for acquired land is computed on whichever of the following formulas is greatest: (1) three-fourths of 1 percent of the fair market value of the lands acquired in fee title; (2) 25 percent of the net refuge receipts collected; or (3) 75 cents per acre of the lands acquired in fee title within the parish.

Lands subject to refuge revenue sharing payments are reappraised every 5 years. The appraisals set the fair market value of the land, based on the highest and best use. The appraised market value of the fee title lands within the refuge, and thus, the revenue sharing payments, would change over time in relation to the changing value of non-refuge lands.

The Service's proposed action (Alternative 2) would result in the acquisition of up to 20,000 acres of wildlife habitat as an expansion of Bayou Cocodrie National Wildlife Refuge, through a combination of fee title purchases and /or donations from willing sellers and less-than-fee interests (conservation easements, cooperative agreements) from willing landowners. The Service believes these are the minimum interests necessary to preserve and protect the fish and wildlife resources in the proposed area.

The private property has been prioritized for acquisition using the following criteria:
•Biological significance;
•Existing and potential threats;
•Significance of the area to refuge management and administration; and
•Existing commitments to purchase or protect land.

Three categories of land acquisition have been established, with the highest priority being the Priority I lands. A description of the lands within each of the three priority groups is given below. Figure 27 summarizes the Service's land protection priorities and proposed methods of acquisition. Figure 28 show the locations of the project areas and their respective priority groups: Priority Group I, Priority Group II, and Priority Group III.

Figure 27. Protection Priorities for the Proposed Expansion and Recommended Methods of Acquisition

Priority Group	No. of Landowners	Approx. Acreage	Type of Acquisition (minimum interest)
I	6	6,390	Fee Title
II	2	8,350	Fee Title
III	6	4,750	Conservation easement, cooperative agreement, or fee title

Figure 28. Land Acquistion Priorities