IV. Environmental Consequences

This section analyzes and discusses the potential environmental effects or consequences that can be reasonably expected with the implementation of each of the four management alternatives described in Section III of this environmental assessment. The planning team selected the following impact topics for analysis: effects on fish and wildlife populations, effects on habitats, effects on land protection and conservation, effects on education and visitor services, and effects on general administration. These topics were chosen based on the important issues and concerns raised at the public scoping meeting and the planning team meetings. For each alternative, the expected outcomes for fish and wildlife species are portrayed through 2019, varying in magnitude with the amount of land proposed to be acquired and the intensity of management.

ALTERNATIVE 1. "NO ACTION" (CURRENT MANAGEMENT)

The No Action alternative would maintain the status quo and was developed using anticipated conditions in the area of Lake Ophelia NWR through the year 2019. 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.

This alternative, included for the purpose of describing baseline conditions, is not considered to be the most effective management strategy for achieving the vision and goals of the Refuge.

EFFECTS ON FISH AND WILDLIFE POPULATIONS

Limited wildlife population monitoring/surveys would occur under Alternative 1. Monitoring and surveys would be limited to monthly waterfowl surveys from November through March, annual wading bird rookery surveys, and an annual deer spotlight survey. The Refuge's wood duck banding quotas would not be met and approximately 50 wood duck boxes would be maintained.

Waterfowl and shorebird use of Refuge habitat would fluctuate greatly from year to year, based on the availability of flooded habitats. During years with optimal rainfall, the Refuge would have the potential to provide flooded habitat capable of supporting 1.9 million duck use days from November through February. In years with below-average rainfall, waterfowl habitat capabilities would be significantly reduced because of inadequate water management infrastructure and water pumping capabilities. Shorebird use of the Refuge would be incidental as no habitat is specifically managed for this species. Snow and white-fronted goose use of the Refuge would be fairly common, but less than the habitat can support. The Refuge provides over 2,500 acres of goose habitat in the form of winter wheat, large open harvested soybean and milo fields and flooded crop and moist-soil units, but annual goose use has consistently been less than 10,000 goose use days per year.

Forest breeding bird and shorebird surveys would be conducted only as interest and funding are available to work with universities and the U.S. Geological Survey's (USGS) Biological Services Division on projects that would look at these species. Forest-dwelling birds would continue to be impacted by forest fragmentation and associated nest parasitism. Woodcock population numbers and habitat use would remain an unknown.

Monitoring of resident game species would be limited to an annual deer spotlight survey, a deer abomasum parasite survey conducted every five years, and harvest data collected on resident game species. Deer populations would be expected to continue to thrive in a mix of cropland, early successional reforestation areas, and bottomland hardwood forest. Deer seasons would be adjusted in terms of season length and bag limit in order to maintain the deer herd at or below carrying capacity. Squirrel and wild

turkey populations would benefit from the maturation of existing reforestation areas. Resident game species would be managed and harvested under basically statewide hunting seasons and bag limits.

Nonnative plants and animals would receive limited management action. An Integrated Pest Management Plan would not be developed. Feral hog populations would be controlled to the extent possible with existing staff and resources. Control actions would be concentrated in the waterfowl sanctuary area, where feral hogs have the greatest impact on agricultural crops, moist-soil plants, roads, and levees. Nonnative invasive plants occurring in Refuge lakes and bayous would be controlled on an as-needed basis to provide boat access for wildlife-dependent recreation.

Threatened and endangered species would be protected based on their observed occurrences. Specific monitoring and surveys for threatened and endangered species occurrence and distribution would not be conducted. Louisiana black bear recovery efforts in the Red River/Three Rivers Source Population Objective Area would be supported to the extent that available staff and resources are available. Forest habitat fragmentation and the lack of forested corridors between forest blocks both on and off the Refuge would continue to hamper restoration of area-sensitive migratory birds and black bear recovery efforts.

Efforts to monitor and survey amphibians and reptiles would be limited to an ongoing project being conducted by the USGS. No future amphibian and reptile monitoring or surveying would be planned. Amphibians and reptiles would benefit from the protection afforded on the Refuge, but habitat benefits from forest and hydrology restoration would be limited to those efforts already in place.

EFFECTS ON HABITATS

Under Alternative 1, the purchase and reforestation of inholdings, and waterfowl management through cooperative farming and moist-soil management, are the primary habitat management activities. Existing habitats are generally protected and enhanced as staff time and funding allow. Only the Refuge's water management impoundments would be actively managed. For the remaining parts of the Refuge, the current habitat mix and configuration would remain the same. The forest blocks would remain somewhat fragmented or have a significant exposed edge, which is the condition that reduces nesting success and the value of the forests for migratory bird species. Some of the forested public lands would remain disconnected from other forest blocks, hampering efforts to create a 100,000-acre forest block in the Red River/Three Rivers Source Population Objective Area.

Overall, these conditions reduce the function of the ecosystem to support biologically diverse plant and animal communities. For example, cerulean warbler, swallow-tailed kite and many other forest interior-nesting birds breed only in large forest tracts. Furthermore, brown-headed cowbirds, a forest edge species that parasitizes songbird nests, would continue to depress the breeding success of forest interior passerine bird species. Little census and inventory work would occur.

The Refuge's existing forest habitats would receive little treatment under Alternative 1; thus forest conditions would not improve for forest nesting birds and black bear. Non-forested inholdings would be reforested as lands are acquired. Efforts would be made to ensure that the existing forest canopy structures remain intact where possible.

Cooperative farming would be utilized on 3,678 acres to provide seasonally flooded grain for waterfowl and maintain moist soil management units and water management infrastructure. Open areas maintained through the cooperative farming program would provide habitat primarily for waterfowl, shorebirds, woodcock, grassland songbirds, white-tailed deer, and other resident wildlife. Farming operations would cause some disturbance to ground-nesting wildlife. Annual discing would result in more soil ero-

sion than in reforested fields. Discing would be limited to spring seed bed preparation; no fall discing would be permitted. Heavy rainfall following discing would cause some erosion and sediment deposition in the surrounding lakes, sloughs and wetlands.

Pest management would be conducted by cooperative farmers and Refuge staff to control undesirable vegetation and insects in crop fields, moist-soil units, road rights-of-way, and administrative areas. Pesticide Use Proposals would be prepared and approved for all pesticides used on the Refuge. In all cases, the least toxic pesticide will be used to control undesirable pests. Only approved pesticides will be used, and they will be used only when the level of pest occurrence observed through crop scouting indicates that pest density is at the economic threshold level. Pesticide label application instructions will be adhered to and efforts will be made to reduce use of chemicals through alternative (nonchemical) pest control techniques.

EFFECTS ON LAND PROTECTION AND CONSERVATION

Under this alternative, the Service would acquire the remaining 20,500 acres within the Refuge's current acquisition boundary, when and if the lands become available for purchase from willing sellers. There are only approximately 2,065 acres of non-forest land in the remaining 20,500 acres within the Refuge acquisition boundary. These non-forest lands are potential reforestation sites through either conservation easements or purchases by the Refuge. Reforesting these sites would help reduce forest fragmentation, but would not provide forested linkages to the surrounding forested WMAs.

Acquisition and/or reforestation of the remaining 20,500 acres in the acquisition boundary would contribute to the overall 100,000-acre forest block large enough to support target populations of Swainson's warbler, cerulean warblers, and swallow-tailed kites. Most of the 20,500 acres remaining in the acquisition boundary is in private ownership and managed as hunt clubs. Most of these lands are not expected to be for sale during the next 15 years; however, the Service may explore the use of conservation easements.

The Refuge supports recovery efforts for the Louisiana black bear by acting as a repatriation site, conducting bear bait station surveys on the Refuge, and providing outreach to landowners on the recovery and management of the bear population. Acquisition of the remaining 20,500 acres in the acquisition boundary would provide managed habitat capable of supporting bears. The Refuge will work with State, Federal, and private partners to protect forested corridors between the Refuge and Grassy Lake and Spring Bayou WMAs.

EFFECTS ON EDUCATION AND VISITOR SERVICES

Under this alternative, the Refuge would fail to achieve the tenets set out in the Refuge Improvement Act of 1997 regarding the six priority public uses, and neither would it achieve the goals in the *Fulfilling the Promise* document. Access to the Refuge for much of the year would be limited to only those owning four-wheel-drive vehicles and participating primarily in hunting and fishing activities. Outside of hunting and fishing, providing for wildlife-dependent recreational activities would remain a low priority.

Time and zone management techniques would not be instituted without funds to improve vehicle access that would enable the reduction and possible elimination of ATV trails and the establishment of hiking-only trails with associated parking areas. Thus, the disturbance to wildlife from ATVs would also remain and possibly increase if visitation increases as expected. Wildlife observation and photography opportunities would continue to be very limited, thus underserving a segment of the visiting public. There would be no environmental education or interpretive facilities or programs. The Refuge could provide an excellent opportunity to teach various segments of the population about ridge and swale topography; however, under this alternative that is unlikely.

EFFECTS ON SOCIOECONOMIC ENVIRONMENT

Maintaining the Refuge's current status quo management strategy would produce no additional socioeconomic impacts due to management changes. While human use patterns would undoubtedly shift with such normal ecological changes as forest maturation, crop rotations, and maintenance of drainage canals and structures, these shifts in usage would not be due to changes in management intervention and would be minor and virtually undetectable at the Refuge level.

EFFECTS ON GENERAL ADMINISTRATION

Under this alternative, no new administrative facilities (maintenance facilities or access roads) would be provided or existing facilities improved. Continuing under current conditions, the Refuge's resource management activities would be based on decisions made 20 miles away, at Grand Cote NWR, and equipment maintenance activities would occur at existing facilities that lack potable water, climate control, and year-round sanitary facilities. Substandard access for resource management and visitors caused by inferior quality roads and trails would persist.

This alternative does not address the current shortage of critical staff, and the staffing level would remain as it is now. Critical Refuge and resource management and protection, visitor services and protection, and facilities and equipment maintenance goals and objectives would remain unfulfilled.

The level of law enforcement activity made possible under this alternative is sufficient to be reactive to most resource and visitor protection needs. However, it does not provide the resources needed to establish a proactive, preventive law enforcement program.

ALTERNATIVE 2. PROPOSED ACTION

Implementing Alternative 2 is considered to be the most effective management action for meeting the purposes of Lake Ophelia NWR; that is, conserving wetlands and migratory birds while reducing forest fragmentation, identifying priority land areas and working with partners to contribute to the 100,000-acre forest block objective for the Red River/Three Rivers Conservation Area, and contributing to a sustainable ecosystem. This alternative is the Service's proposed management action.

EFFECTS ON FISH AND WILDLIFE POPULATIONS

Extensive wildlife population monitoring/surveying would occur under Alternative 2 in order to assess population status, trends, wildlife habitat associations, and population responses to habitat management. Monitoring and surveys would be conducted systematically for a broad range of species, including: waterfowl, shorebirds, wading birds, forest-dwelling songbirds, black bear, white-tailed deer, furbearers, amphibians and reptiles, fish, and other resident wildlife. Some surveys would be conducted annually, while others would be conducted only frequently enough to determine population status and trends. Refuge wood duck banding quotas (250 ducks) would be consistently met and approximately 75 wood duck boxes would be maintained.

Duck and shorebird use of the Refuge would improve significantly as intensive water management efforts would provide dependable flooded habitats to match the migration chronologies of these species. The Refuge would manage and maintain a wetland complex composed of cropland, moist soil units, and forested wetlands capable of supporting a minimum of 2.5 million duck use days and 4,000+ shorebird use days on an annual basis. Additional duck and shorebird use days would be provided on the over 700 acres of unmanaged natural lakes and bayous on the Refuge. During the 15-year life of this plan, goose habitat would be

significantly reduced as agricultural land is reforested. However, the remaining 1,105 acres of managed cropland and moist soil units should provide habitat capable of supporting over 30,000 goose use days.

Forest breeding birds would benefit from Refuge land acquisition, reforestation, and forest management actions under Alternative 2. Forest fragmentation and associated nest parasitism would be reduced as the Refuge reforests up to 5,766 acres of non-forested land within the current Refuge boundary, protects lands within the Refuge acquisition boundary, and works with State, Federal, and private partners to protect areas outside the current acquisition boundary. The 100,000-acre forest block objective for the Red River/Three Rivers Source Population Objective Area would be met.

Woodcock population numbers and habitat use would be monitored and managed under Alternative 2. Woodcock resting and feeding habitat in the form of fallow fields and scrub/shrub habitat would be created and managed specifically for wintering woodcock. Woodcock use of the Refuge would be expected to increase under this alternative.

Monitoring of resident game species would be expanded to include white-tailed deer, turkey, small game, and furbearers. Harvest data would be collected on all resident game species through hunter check stations and self-clearing permits. Refuge land acquisition would benefit resident game populations through reforestation, land management, and protection. Deer populations would be expected to increase in the Refuge's habitat mix of cropland, early successional reforestation areas, and bottomland hardwood forest. The Refuge's deer hunting seasons would be adjusted in terms of season length and bag limit to ensure a harvest that would maintain the deer population at or below carrying capacity. Squirrel and wild turkey populations would benefit from Refuge land acquisition and from the protection and maturation of existing reforestation areas. Resident game species would be managed and harvested under statewide hunting seasons and bag limits.

Nonnative plants and animals would receive increased management action. An Integrated Pest Management Plan would be developed to guide the control of nonnative plants and animals in an environmentally friendly manner. Feral hog populations would be controlled in a systematic manner throughout the Refuge. Feral hogs cannot be totally eliminated on the Refuge, because of immigration of feral hogs from adjoining private lands; however, the feral hogs would be controlled on the Refuge to a level that minimizes competition with native wildlife and habitat degradation. Nonnative invasive plants, such as water hyacinth and hydrilla, occurring in Refuge lakes and bayous would be controlled aggressively. Control actions would focus on controlling the nonnative species, while safeguarding the native aquatic species that are valuable to many fish and wildlife.

Specific monitoring and surveys for threatened and endangered species occurrence and distribution would occur throughout the Refuge and the adjoining Red River. Refuge land acquisition, reforestation, and protection would benefit the recovery of threatened and endangered species. Louisiana black bear recovery efforts in the Red River/Three Rivers Source Population Objective Area would be fully supported with Refuge staff and resources. Refuge reforestation and forest management actions would provide improved habitat in support of black bear recovery efforts. Pallid sturgeon recovery efforts would be supported under Alternative 2 by habitat restoration, technical assistance to other private landowners bordering the Red River, and assistance with Service recovery efforts.

Refuge amphibian and reptilian populations would be monitored and surveyed on a periodic basis to assess their occurrence and population trends. These species are good indicators of overall environmental health, and their status would be monitored in response to Refuge restoration and management activities. Amphibians and reptiles would be expected to benefit from forest restoration and management, hydrology restoration (managed seasonal flooding), implementation of an integrated pest management

plan, and the protection afforded on the Refuge. A survey of the Refuge's alligator population would be conducted. Depending on survey results, the Refuge could potentially allow some recreational alligator harvest if the population could support a limited harvest and recreational harvest of alligators was found to be compatible with Refuge purposes.

Fishery resources would be monitored and surveyed in the Refuge's lakes and bayous. Fisheries management efforts would be directed at maintaining balanced fish stocks capable of supporting a productive recreational fishery. Fish stocking and rough fish removal would be utilized as needed to maintain a productive fishery. Control of nonnative aquatic vegetation would improve water quality, reduce oxygen depletion from decomposition of aquatic vegetation, and support healthier fish populations.

An expanded research capability would contribute to the gathering of information that will have implications for management decisions at the national, regional, State, and local levels. This research would also contribute to our overall scientific understanding of a number of species and their relationships to the various ecosystems they inhabit.

EFFECTS ON HABITATS

Under Alternative 2, protection within the current Refuge acquisition boundary; reforestation of Refuge cropland and other acquired cropland; active forest management; and providing seasonal flooding on 405 – 775 acres of unharvested agricultural crops, 330 – 700 acres of moist-soil units, 50 acres of shorebird mudflat habitat, and 345 acres of forested wetlands are the primary habitat management activities. Approximately 1,178 acres of existing Refuge cropland would be reforested in three phases over the next 15 years, as the Refuge obtains the staff and equipment required to operate and maintain 1,155 acres of managed water units and associated water management infrastructure. Priority lands outside current boundary would be targeted for conservation working with partners.

Forest fragmentation would be significantly reduced, which would improve nesting success and the value of forests for migratory bird species. These public and private reforestation efforts would contribute to the 100,000-acre forest block objective for the Red River/Three Rivers Source Population Objective Area. Overall, these forest restoration actions would do more to improve the function and values of the forest ecosystem to support biologically diverse plant and animal communities than any other management action. The 100,000-acre forest block would provide suitable nesting habitat for area-sensitive migratory birds, provide enough forested habitat linked together to support black bear recovery efforts, and improve the area's hydrology and water quality.

This alternative would implement forest management actions that result in the maintenance and development of understory, mid-story, and overstory stand components (i.e., a complex vertical forest stand structure) to meet the needs of Neotropical migratory birds. The development and maintenance of a dominant and/or emergent tree crown class component would aid in establishing or maintaining species such as the swallow-tailed kite and cerulean warbler.

The existing cooperative farming program on 3,678 acres would be reduced in three phases. Open areas maintained through the cooperative farming program or Refuge management would provide habitat primarily for waterfowl, shorebirds, grassland songbirds, white-tailed deer, the threatened Louisiana black bear, and other resident wildlife. Discing, bush-hogging, and other tillage operations used to maintain cropland and moist-soil units would cause some disturbance to ground-nesting wildlife. Discing would occur annually in cropland areas and every 2 to 4 years in moist-soil units, resulting in more soil erosion than in reforested fields. Overall, discing would be significantly reduced as the cropland becomes reforested. Discing would be limited to spring seedbed preparation and moist-soil maintenance. Heavy rain-

fall following discing would cause some erosion and sediment deposition in the surrounding lakes, sloughs, and wetlands.

Pest management would be conducted by cooperative farmers and Refuge staff to control undesirable vegetation and insects in crop fields, moist-soil units, road rights-of-way, and administrative areas. Pesticide Use Proposals would be prepared and approved for all pesticides used on the Refuge. In all cases, the least toxic pesticide would be used to control undesirable pests. Only approved pesticides will be used, and they will be used only when the level of pest occurrence observed through crop scouting indicates pest density is at the economic threshold level. Pesticide label application instructions will be adhered to and efforts will be made to reduce use of chemicals through alternative (nonchemical) pest control techniques.

EFFECTS ON LAND PROTECTION AND CONSERVATION

This alternative would result in the Service protecting up to 20,500 acres remaining within the current acquisition boundary. Conservation efforts would focus on restoration of hydrology and reforestation. These conservation efforts could be accomplished through Refuge land acquisition or enrollment of private lands into various conservation easement programs. A Refuge position would be added for Refuge private lands biologist to work with private landowners and other conservation agencies interested in restoring and managing private property in the Red River/Three Rivers Source Population Objective Area. Refuge land acquisition would be from willing sellers only. Lands acquired for the Refuge would be restored and managed as appropriate to achieve the Refuge's purposes, goals, and objectives.

The Refuge supports recovery efforts for the Louisiana black bear by acting as a repatriation site, conducting bear bait station surveys on the Refuge, and providing outreach to landowners on the recovery and management of the bear population. Acquisition of the remaining 20,500 acres in the acquisition boundary would provide managed habitat capable of supporting bears. The Refuge will work with State, Federal, and private partners to protect forested habitat corridors between the Refuge and the Grassy Lake and Spring Bayou WMAs.

A cultural resources survey would be completed on all Refuge lands to document the location and significance of all cultural resources. All Refuge construction and maintenance activities that could potentially impact cultural resources would be reviewed by the Service's Regional Archeologist and the State Historic Preservation Officer. Ultimately, the Refuge's cultural resources would receive a greater degree of protection by being part of the Refuge System.

EFFECTS ON EDUCATION AND VISITOR SERVICES

Under this alternative, a balanced program of the six priority wildlife-dependent recreational activities as defined in the Refuge Improvement Act of 1997 and the *Fulfilling the Promise* document will be achieved. Time and zone management techniques would need to be instituted in order to avoid conflicts between different user groups. As road access is improved to and through the Refuge, ATV trails would be reduced and in some cases eliminated. This would decrease the disturbance to wildlife caused by these vehicles. The use of motorized boats would also be prohibited in certain parts of the Refuge during certain times of the year, further decreasing wildlife disturbance.

As facilities for wildlife observation and photography are developed and opened to the public, time and zone management techniques would need to be developed and incorporated into the overall Refuge management program. Some of these would include the expansion of quota hunt systems, seasonal access, and possible area closures. As environmental education and interpretive programs become available, there would be opportunities for the public to learn about ridge and swale communities, bottomland

hardwood forests, and wildlife and their habitat. With these new opportunities, awareness of conservation issues, and of the Service, and the Refuge System, should increase along with community support.

In addition, this approach would emphasize the initiation of community-based environmental educational programs coordinated with local schools. The programs would provide direct access for students through activity stations, foot trails, and gathering sites, and would assist local teachers with curriculum and support materials for use on and off the Refuge.

EFFECTS ON SOCIOECONOMIC ENVIRONMENT

This alternative provides for the most balanced increase in the potential for local user activities; regional and national tourism, with benefits for the local community; and regional and national recreation activities, as well as research-supporting activities.

The primary direct effect on local users would be the increased utilization of existing Refuge holdings for recreational, educational, and hunting and fishing opportunities through improved vehicular access and the potential for the expansion of these activities through additional Refuge acquisition inside and outside of the Refuge's existing boundaries.

Refuge staff would provide technical assistance for local landowners interested in restoring or maintaining fish and wildlife habitats on their property and encourage partnerships with local landowners to achieve wildlife and habitat objectives.

This approach would also allow the maximization of the mix of the various species that potentially draw regional and national visitors to the Refuge and contribute to local tourism revenue, including: shorebirds and wading birds, Neotropical migratory birds, and waterfowl. Increasing waterfowl habitat would also have regional and national effects on the availability of waterfowl for hunting and recreational purposes.

In addition, this alternative would result in keeping approximately 2,500 acres of cooperative farming, which would positively affect individual cooperative farmers and local agricultural supply businesses.

Finally, this alternative would provide nine additional full-time positions associated with the management and operation of Lake Ophelia and Grand Cote NWRs in Avoyelles Parish. These positions would potentially be filled by individuals who live and do business in the local communities.

EFFECTS ON GENERAL ADMINISTRATION

Under this alternative, new administrative facilities (maintenance facilities and access roads) would be provided or existing facilities improved. Resource management activities would be based at the Refuge and equipment maintenance facilities would be provided with potable water, climate control, and year-round sanitary facilities. Also, access for resource management and visitors would be improved by upgrading roads and trails to all-weather access. These activities may cause some wildlife disturbances and small-scale, site-specific soil erosion and damage to vegetation. Activities would be timed to cause the least amount of disturbance to wildlife. Siltation barriers would be used to minimize soil erosion, and all disturbed sites would be restored to as natural a condition as possible.

This alternative would address the shortage of critical staff and staffing level by providing nine new positions. Critical Refuge resource management and protection, visitor services and protection, and facilities and equipment maintenance goals would be attained.

The level of law enforcement activity made possible by this alternative would be sufficient to continue reactive resource and visitor protection and initiate proactive, preventive law enforcement programs.

ALTERNATIVE 3

This alternative is considered the most effective management approach for reducing forest fragmentation and achieving a 100,000+-acre forest block in the Red River/Three Rivers Source Population Objective Area through publicly owned land. Forest-dwelling wildlife species, including Neotropical migratory birds and the Louisiana black bear, would benefit the most from this alternative. Migratory waterfowl and shorebird habitat would be reduced under this alternative as open foraging habitat becomes reforested.

EFFECTS ON FISH AND WILDLIFE POPULATIONS

Extensive wildlife population monitoring and surveys would be done under Alternative 3 in order to assess population status, trends, wildlife habitat associations, and population responses to habitat management. Monitoring and surveys would be conducted systematically for a broad range of species, including: waterfowl, shorebirds, wading birds, forest-dwelling songbirds, black bear, white-tailed deer, furbearers, amphibians and reptiles, fish, and other resident wildlife. Some surveys would be conducted annually, while others would only be conducted frequently enough to determine population status and trends. Refuge wood duck banding quotas (250 ducks) would be consistently met, and approximately 100 wood duck boxes would be maintained.

Duck and shorebird use of the Refuge would decline significantly as all but 240 acres of floodable cropland and moist-soil habitat becomes reforested. Intensive water management efforts would provide 1,500 acres of dependable flooded habitat. Most of the flooded acreage (1,260 acres) would be early successional reforestation sites and forested wetlands. The reforested sites would contain valuable moist-soil plants utilized by waterfowl for the first 3 to 4 years after being reforested. Thereafter, these sites would develop a later successional understory with significantly less foraging value to waterfowl. The resulting wetland complex, composed of 100 acres of cropland, 140 acres of moist-soil units, and 1,500 acres of forested wetlands, would be capable of supporting approximately 1.3 million duck use days. No acreage would be managed specifically for shorebirds, but some incidental shorebird use would be expected on the 240 acres of cropland and moist-soil habitat managed for waterfowl. Additional duck and shorebird use days would be provided on the over 700 acres of unmanaged natural lakes and bayous on the Refuge. Goose habitat would be eliminated as all but 240 acres of cropland would be reforested.

Forest breeding birds would benefit significantly from Refuge land acquisition, reforestation, and forest management actions under Alternative 3. These efforts would reduce forest fragmentation and associated nest parasitism and would ultimately create a 100,000+-acre forest block within the Red River/Three Rivers Source Population Objective Area, capable of supporting breeding populations of area-sensitive species such as the Swainson's warbler, cerulean warbler and swallow-tailed kites.

Woodcock population numbers and habitat use would be monitored and managed under Alternative 3. Woodcock resting and feeding habitat in the form of fallow fields and scrub/shrub habitat would be created and managed specifically for wintering woodcock. Woodcock use of the Refuge may decline as most cropland used for nocturnal foraging by woodcock becomes reforested.
Monitoring of resident game species would be expanded to include white-tailed deer, turkey, small game, and furbearers. Harvest data would be collected on all resident game species through hunter check stations and self-clearing permits. Refuge land acquisition would benefit resident game populations through reforestation, land management, and land protection. Deer densities would be expected to increase following cropland reforestation and active forest management of bottomland hardwood forest. However, in the long term (25+ years) the Refuge's deer-carrying capacity may decline due to the loss of cropland and

early successional forest that produce important deer browse. Refuge deer hunting seasons would be adjusted in terms of season length and bag limit to ensure a harvest that would maintain the deer population at or below carrying capacity. Squirrel and wild turkey populations would benefit from Refuge land acquisition and from the protection and maturation of existing reforestation areas. Resident game species would be managed and harvested under basically statewide hunting seasons and bag limits.

The environmental consequences of implementing Alternative 3 on nonnative plants and animals, threatened and endangered species, amphibians and reptiles, and fish would be the same as those described previously for Alternative 2.

EFFECTS ON HABITATS

This alternative would result in the Service protecting up to 39,000 acres in the proposed boundary expansion. Under Alternative 3, expansion of the Refuge acquisition boundary; reforestation of Refuge cropland and other acquired cropland; active forest management; and providing approximately seasonal flooding on 100 acres of crops, 140 acre of moist-soil units, and 1,500 acres of forested wetlands are the primary habitat management activities. Acquisition from willing sellers would be one option used to expand conservation efforts in the expansion area. Approximately 3,438 acres of existing Refuge cropland would be reforested in the first two years of this alternative. Potentially up to 13,000 acres of additional reforestation is possible in the expanded acquisition boundary, depending on the availability of willing sellers to sell marginal farm land or enroll in conservation easement programs.

Forest fragmentation would be significantly reduced, which would improve nesting success and the value of forests for migratory bird species. These public and private reforestation efforts would provide a forest block greater than the 100,000-acre forest block objective for the Red River/Three Rivers Source Population Objective Area. Overall, these forest restoration actions would do more to improve the function and values of the forest ecosystem to support biologically diverse plant and animal communities than any other management action. Restoration of a 100,000+-acre forest block would provide suitable nesting habitat for area-sensitive migratory birds, provide enough forested habitat linked together to support black bear recovery efforts, and improve the area's hydrology and water quality.

Pest management would be conducted by cooperative farmers and Refuge staff to control undesirable vegetation and insects in crop fields, moist-soil units, road rights-of-way, and administrative areas. Pesticide Use Proposals would be prepared and approved for all pesticides used on the Refuge. In all cases, the least toxic pesticide would be used to control undesirable pests. Only approved pesticides will be used, and they will be used only when the level of pest occurrence observed through crop scouting indicates pest density is at the economic threshold level. Pesticide label application instructions will be adhered to and efforts will be made to reduce use of chemicals through alternative (nonchemical) pest control techniques.

EFFECTS ON LAND PROTECTION AND CONSERVATION

This alternative would result in the Service protecting up to 20,500 acres remaining within the current acquisition boundary and 39,000 acres in the newly expanded acquisition boundary. Conservation efforts would focus on restoration of hydrology and reforestation. These conservation efforts could be accomplished through Refuge land acquisition or enrollment of private lands into various conservation easement programs. A Refuge position would be added for a Refuge private lands biologist to work with private landowners and other conservation agencies interested in restoring and managing private property in the Red River/Three Rivers Source Population Objective Area. Refuge land acquisition would be from willing sellers only. Lands acquired for the Refuge would be restored and managed as appropriate to

achieve the Refuge's purposes, goals, and objectives. However, land acquisition and protection would largely be accomplished by Federal ownership instead of working with partners.

EFFECTS ON EDUCATION AND VISITOR SERVICES

The effects of this alternative on education and visitor services would be the same as those previously described under Alternative 2.

EFFECTS ON SOCIOECONOMIC ENVIRONMENT

This alternative provides for increased potential for local user activities; regional and national tourism, with benefits for the local community; and regional and national recreational and research-supporting activities.

The primary direct effect on local users would be the increased utilization of existing Refuge holdings for recreational, educational, and hunting and fishing opportunities through improved vehicular access and the potential for the expansion of these activities through additional Refuge acquisition inside and outside of existing boundaries.

This alternative would allow the maximization of some of the species that potentially draw regional and national visitors to the Refuge and contribute to local tourism revenue, most notably Neotropical migratory birds. This alternative, however, would result in the loss of habitat for shorebirds, wading birds, waterfowl, and possibly other resident species. These reductions would probably result in a net overall loss of tourism potential. In addition, decreasing waterfowl habitat would have negative regional and national effects on the availability of waterfowl for hunting and recreational purposes.

In addition, this alternative would result in eliminating the cooperative farming program, which would negatively affect individual cooperative farmers and local agricultural supply businesses.

Finally, this alternative would provide seven additional full-time positions, which would potentially be filled by individuals who live and do business in the local communities.

EFFECTS ON GENERAL ADMINISTRATION

The effects of this alternative on general administration would be the same as those previously described under Alternative 2, except only 7 new positions would be required.

ALTERNATIVE 4

This alternative would provide more waterfowl and shorebird habitat than the other alternatives. Forest fragmentation would not be reduced significantly, and the accomplishment of the 100,000-acre forest block objective would be largely dependent on the reforestation of private lands.

EFFECTS ON FISH AND WILDLIFE POPULATIONS

Extensive wildlife population monitoring/surveying would be done under Alternative 4 in order to assess population status, population trends, wildlife habitat associations, and population responses to habitat management. Monitoring and surveys would be conducted systematically for a broad range of species including: waterfowl, shorebirds, wading birds, forest-dwelling songbirds, black bear, white-tailed deer,

furbearers, amphibians and reptiles, fish, and other resident wildlife. Some surveys would be conducted annually, while others would only be conducted frequently enough to determine population status and trends. Refuge wood duck banding quotas (250 ducks) would be consistently met, and approximately 100 wood duck boxes would be maintained.

Duck and shorebird use of the Refuge would improve significantly as intensive water management efforts would provide dependable flooded habitats to match the migration chronologies of these species. The Refuge would manage and maintain a wetland complex composed of cropland, moist-soil units, and forested wetlands capable of supporting a minimum of 3.8 million duck use days and 4,000+ shorebird use days on a annual basis. Additional duck and shorebird use days would be provided on the over 700 acres of unmanaged natural lakes and bayous on the Refuge. During the 15-year life of this plan, goose habitat would exceed current use levels. Goose use could be expected to increase due to available winter wheat browse, grain, and Refuge sanctuary. Available habitat could potentially support 1.0 million goose use days.

Forest breeding birds would benefit from Refuge land acquisition, reforestation, and forest management actions under Alternative 4. Forest fragmentation and associated nest parasitism would be reduced as the Refuge becomes able to acquire and reforest the 2,065 acres of non-forest land within the Refuge acquisition boundary. The 100,000-acre forest block objective for the Red River/Three Rivers Source Population Objective Area would be dependent on reforestation of private property.

Woodcock population numbers and habitat use would be monitored and managed under Alternative 4. Woodcock resting and feeding habitat in the form of fallow fields and scrub/shrub habitat would be created and managed specifically for wintering woodcock. Woodcock use of the Refuge would be expected to increase under Alternative 4.

Monitoring of resident game species would be expanded to include white-tailed deer, turkey, small game, and furbearers. Harvest data would be collected on all resident game species through hunter check stations and self-clearing permits. Refuge land acquisition would benefit resident game populations through reforestation, land management and protection. Deer populations would be expected to remain fairly stable in the Refuge's habitat mix of cropland, early successional reforestation areas, and bottomland hardwood forest. Refuge deer hunting seasons would be adjusted in terms of season length and bag limit to ensure a harvest that would maintain the deer population at or below carrying capacity. Squirrel and wild turkey populations would benefit from Refuge land acquisition and from the protection and maturation of existing reforestation areas. Resident game species would be managed and harvested under basically statewide hunting seasons and bag limits.

Nonnative plants and animals would receive increased management action. An Integrated Pest Management Plan would be developed to guide the control of nonnative plants and animals in an environmentally friendly manner. Feral hog populations would be controlled in a systematic manner throughout the Refuge. Feral hogs cannot be totally eliminated on the Refuge, because of immigration of feral hogs from adjoining private lands; however, the feral hogs would be controlled on the Refuge to a level that minimizes competition with native wildlife and habitat degradation. Nonnative invasive plants, such as water hyacinth and hydrilla, occurring in Refuge lakes and bayous would be controlled aggressively. Control actions would focus on controlling the nonnative species, while safeguarding native aquatic species that are valuable to many fish and wildlife species.

Specific monitoring and surveys for threatened and endangered species occurrence and distribution would occur throughout the Refuge and the adjoining Red River. Refuge land acquisition, reforestation, and protection would benefit the recovery of threatened and endangered species. Refuge reforestation and forest

management actions would be insufficient to fully support black bear recovery efforts, due to few public lands being reforested or kept in reforestation. Forested linkages or travel corridors between the Refuge and the Grassy Lake and Spring Bayou WMAs would be identified and prioritized. Pallid sturgeon recovery efforts would be supported under Alternative 4 by providing technical habitat restoration assistance to other private landowners bordering the Red River and assisting with Service recovery efforts.

Refuge amphibian and reptilian populations would be monitored and surveyed on a periodic basis to assess occurrence and population trends. These species are good indicators of overall environmental health and their status would be monitored in response to Refuge restoration and management activities. Amphibians and reptiles would be expected to benefit from forest management, hydrology restoration (managed seasonal flooding), implementation of an integrated pest management plan, and the protection afforded on the Refuge. Some amphibian and reptile habitat would be negatively affected due to necessary early spring drainage and pesticide use associated with the cooperative farm program. A survey of the Refuge's alligator population would be conducted. Depending on survey results, the Refuge could potentially allow some recreational alligator harvest if the population could support a limited harvest and recreational harvest of alligators was found to be compatible with Refuge purposes.

Fishery resources would be monitored and surveyed in the Refuge's lakes and bayous. Fisheries management efforts would be directed at maintaining balanced fish stocks capable of supporting a productive recreational fishery. Fish stocking and rough fish removal would be utilized as needed to maintain a productive fishery. Control of nonnative aquatic vegetation would improve water quality, reduce oxygen depletion from decomposition of aquatic vegetation, and support healthier fish populations.

The beneficial effects of conducting research under this alternative would be the same as those described for Alternative 2.

EFFECTS ON HABITATS

Under Alternative 4, active forest management, development of a water management infrastructure (water control structures and irrigation wells) capable of providing complete water control on approximately 1,500 acres of seasonally flooded crops, moist-soil units, and forested wetlands is the primary habitat management activities. The cooperative farming program would remain an integral part of the Refuge's habitat management program. Annual seasonal flooding regimes would provide dependable flooding on 300-550 acres of moist-soil habitat, 605-855 acres of unharvested and harvested agricultural crops, 50 acres of shorebird mudflat habitat, and 345 acres of forested wetlands.

Reforestation of up to 2,065 additional acres within the Refuge's current acquisition boundary may be possible, depending on the availability of willing sellers to sell marginal farm land or enroll in conservation easement programs. Forest fragmentation in the Red River/Three Rivers Source Population Objective Area would continue to suppress area-sensitive Neotropical migratory birds and the Louisiana black bear. Reducing forest fragmentation outside the Refuge acquisition boundary would be promoted by a Refuge private lands biologist working in concert with U.S. Department of Agriculture programs that provide incentives for private landowners to conduct forest and hydrology restoration. These private reforestation efforts could potentially accomplish the 100,000-acre forest block objective for the Red River/Three Rivers Source Population Objective Area.
Open areas maintained through the cooperative farming program or Refuge management would provide habitat primarily for waterfowl, shorebirds, grassland songbirds, white-tailed deer, and other resident wildlife. Discing, bush-hogging, and other tillage operations used to maintain cropland and moist-soil units would cause some disturbances to ground-nesting wildlife. Discing would occur annually in cropland areas and every 2 to 4 years in moist-soil units, resulting in more soil erosion than in reforested

fields. Discing would be limited to spring seedbed preparation and moist-soil maintenance. Heavy rainfall following discing would cause some erosion and sediment deposition in surrounding lakes, sloughs, and wetlands. Vegetated buffer strips would be maintained around all agricultural fields and moist-soil units to minimize soil movement in the areas surrounding the Refuge's water bodies.

Pest management would be conducted by cooperative farmers and Refuge staff to control undesirable vegetation and insects in crop fields, moist-soil units, road rights-of-way and administrative areas. Pesticide Use Proposals would be prepared and approved for all pesticides used on the Refuge. In all cases, the least toxic pesticide would be used to control undesirable pests. Only approved pesticides will only be used, and they will be used only when the level of pest occurrence observed through crop scouting indicates pest density is at the economic threshold level. Pesticide label application instructions will be adhered to, and efforts will be made to reduce the use of chemicals through alternative (nonchemical) pest control techniques. Integrated Pest Management would be utilized to the fullest extent possible to use nonchemical pest control technologies.

EFFECTS ON LAND PROTECTION AND CONSERVATION

Under this alternative, the Service would acquire the remaining 20,500 acres within the Refuge acquisition boundary when and if the lands become available for purchase from willing sellers. There are only approximately 2,065 acres of non-forest land in the remaining 20,500 acres within the Refuge acquisition boundary. These non-forest lands are potential reforestation sites through either conservation easements or purchase by the Refuge. Reforesting these sites would help reduce forest fragmentation, but would not provide forested linkages to the surrounding forested WMAs.

Acquisition and/or forest management on the remaining 20,500 acres in the acquisition boundary would create a forest block large enough to support target populations of some species such as the Swainson's warbler, but it would not be a large enough to provide a contiguous forested block for the support of cerulean warblers and swallow-tailed kites. Most of the 20,500 acres remaining in the acquisition boundary is in private ownership and managed as hunt clubs. Most of these lands are not expected to be for sale during the next 15 years.

The Refuge supports recovery efforts for the Louisiana black bear by acting as a black bear repatriation site, conducting bear bait station surveys on the Refuge, and providing outreach to landowners on the recovery and management of the bear population. Acquisition of the remaining 20,500 acres in the acquisition boundary would provide managed habitat capable of supporting bears. The Refuge will work with State, Federal, and private partners to protect forested habitat corridors between the Refuge and the Grassy Lake and Spring Bayou WMAs.

EFFECTS ON EDUCATION AND VISITOR SERVICES

The effects of this alternative on education and visitor services would be the same as those previously described under Alternative 2.

EFFECTS ON SOCIOECONOMIC ENVIRONMENT

The waterfowl emphasis alternative provides for increased potential for local user activities; regional and national tourism, with benefits for the local community; and regional and national recreational and research-supporting activities.

The primary direct effect on local users would be the increased utilization of existing Refuge holdings for recreational, educational, and hunting and fishing opportunities through improved vehicular

access and the potential for the expansion of these activities through additional Refuge acquisition inside existing boundaries.

The waterfowl emphasis approach would also allow the maximization of some species that potentially draw regional and national visitors to the Refuge and contribute to local tourism revenue, most notably waterfowl, shorebirds, and wading birds. This alternative would, however, result in the loss of habitat for Neotropical migratory birds. Increasing waterfowl habitat would have regional and national effects on the availability of waterfowl for hunting and recreational purposes.

In addition, Alternative 4 would result in the continuation and possible expansion of cooperative farming on the Refuge.

Finally, this alternative would provide seven additional full-time positions for the Central Louisiana Refuge Complex in Avoyelles Parish. These employees would live and do business in the local communities.

EFFECTS ON GENERAL ADMINISTRATION

The effects of this alternative on general administration would be the same as those previously described under Alternative 2, except that only seven additional full-time positions would be added.

COMPARISON OF EFFECTS AMONG ALTERNATIVES

OVERVIEW

The Refuge's current management actions described in Alternative 1, such as its hunting and fishing program, its water management activities, and its present efforts to acquire inholdings within the present Refuge acquisition boundary, would have minimal negative effects to no effects on the environment. The proposed management actions described in Alternatives 2 and 3, such as upgrading roads to vehicular standards, developing strategic interpretation and environmental education facilities, acquiring private property from willing sellers within the current acquisition boundary, and restoring all forests to varying degrees, would have minimal negative effects on the environment. The proposed management actions described in Alternative 4, such as developing additional water management facilities, upgrading roads to vehicular standards, and developing strategic interpretation and environmental education facilities, would have minimal negative effects on the environment. Implementation of Alternatives 2, 3, and 4 can influence agricultural production, related employment and income, and outdoor recreation and environmental education opportunities.

BIOLOGICAL ENVIRONMENT

Each alternative would protect existing habitat important to migratory birds, mammals, reptiles, amphibians, fish, and invertebrates. Alternative 2 provides a balanced approach to increased management of migratory waterfowl and shorebirds and to reforestation efforts for forest-dwelling wildlife, including Neotropical migratory birds. Alternative 3 is designed to maximize the area of the forest block to provide habitat for forest-dwelling wildlife, especially forest-interior-nesting Neotropical migratory birds. It would increase the size of the Refuge to support species of management concern, provide a forested connection with the Spring Bayou and Grassy Lake Wildlife Management Areas, and significantly improve public access and other visitor services. Alternative 3 would have a significantly greater effect on protecting and managing fish and wildlife resources in the NWR. Alternative 4 is designed to maximize the production of waterfowl habitat (i.e., food and water).

The Refuge's waterfowl and shorebird populations may be affected by the increased access and visitor services provided in Alternatives 2, 3, and 4. However, foraging habitat for waterfowl and shorebirds would improve under Alternatives 2 and 4 because of the improved aquatic habitats and managed water impoundments proposed under these alternatives. Wood duck and woodcock populations would increase under Alternatives 2, 3, and 4.

Lake Ophelia National Wildlife Refuge is part of the Cerulean warbler's former range. This species, now rarely seen, was once common in the area that is now Refuge. Cerulean warblers feed and nest in large (greater than 50,000 acres) forest patches of mature, dense canopy tree stands (over 40 years in age) and typically choose stands with the largest trees for nesting (over 100 years in age) (Hunter 1999). Swallow-tailed kites nest in similar habitats. The remaining mature forests on Lake Ophelia NWR have been degraded due to years of high-grading. High levels of crown closure interspersed with large, emergent trees are positively correlated with nest site location and success for these birds. The forest management activities outlined in Alternatives 2 and 3 would cause long-term benefits in improving the nesting habitat for these species.

The Swainson's warbler is a passerine migrant that inhabits canebrakes and dwarf palmetto, spending most of its time near the ground searching for insects. It breeds in large swamps and bottomlands and prefers nesting in dense cane near or over water. The existing habitat on the Refuge has largely been degraded due to past land management practices and clearing of swamps and bottomlands. The forest habitat restoration programs described under Alternatives 2 and 3 would positively benefit nesting and feeding habitat for this species, as well as other priority bird species such as the white-eyed vireo, prothonotary warbler, American woodcock, wood thrush, and hooded warbler.

Reforesting the areas proposed in Alternatives 2 and 3 would decrease the number of cowbirds parasitizing forest breeding bird nests and would thus improve the nesting success of many passerines.

Each alternative would protect sites important to forest interior breeding birds and the Louisiana black bear. Alternatives 1 and 4 would provide the least area of habitat protection, while Alternatives 2 and 3 have the potential to provide greater management capabilities and larger areas of habitat protection. Alternative 2 is designed to provide the potential for greater management capabilities and larger areas of habitat protection by working with State, Federal, and private partners for the prioritization of forested corridors. Alternative 3 is designed to provide greater management capabilities and larger areas of habitat protection through expansion of the Refuge boundary and public lands.

The Service's recovery plan for the Louisiana black bear identifies two viable subpopulations in need of recovery. These separated populations, one each in the Atchafalaya and the Tensas river basins, have immigration and emigration corridors between them (refer to CCP Figure 1-4,). The Red River/Three Rivers Complex (which contains Lake Ophelia NWR) is the largest unoccupied forested area between these two subpopulations. During the springs of 2003 and 2004 the Louisiana black bear repatriation project successfully relocated 11 adult female bears (radio-collared) with cubs on Lake Ophelia NWR. As of fall 2004, a majority of these bears either are using the Refuge or are on adjacent private lands. Refuge staff assisted in implementing all phases of repatriation and will continue to assist in black bear management, nuisance control, and pubic outreach. Common disturbance effects to black bear include traffic from roads, paths, and trails; farm and timber management activities; hunting; and residential development. These effects would be greater under Alternatives 1 and 4 due to a more fragmented land ownership and lack of Service management capability. However, under Alternative 2, the Refuge would identify and prioritize lands that would provide linkages between hardwood forest tracts and wildlife, soil, and water conservation benefits. In addition, Alternatives 2, 3, and 4 propose the expansion of hunting opportunities and/or recreational facilities, resulting in more visitors to the Refuge. However, trail density and human disturbances from visitor recreation would remain relatively low and are not expect-

ed to negatively affect the black bear reintroduction efforts. Temporary closures to public access may be necessary in some management units in order to mitigate the effects of these activities to threatened, endangered, and rare species, including the Louisiana black bear.

Although there are no known nesting areas on the Refuge, eagles have been sighted and during 2003 and 2004 a pair of eagles produced some false nests within the closed waterfowl sanctuary area. Bald eagles are vulnerable to human activity around nesting areas and do not tolerate human disturbances during the breeding season. Recreational activities including hiking, hunting, and the use of ATVs and small fishing craft can be a major disturbance to bald eagles. The level of recreational use is least disturbing to wildlife under Alternative 1, and most disturbing under Alternatives 2, 3, and 4. The level of recreational use expected under Alternatives 2, 3, and 4 includes disturbances related to hiking, hunting, and fishing and could preclude the possibility of eagles establishing a nest where most of the proposed recreational activities would occur. The expansion of forest management activities described in Alternatives 2 and 3 may also affect bald eagles nesting on the Refuge over the short term. However, forest harvesting operations would be relegated to dry season (late summer to early fall), and management activities are those that create nesting habitat, i.e., emergent trees. Hunting is primarily a winter season activity. Over the long term, Alternatives 2, 3, and 4 would produce a number of suitable nests and roosting trees for bald eagles.

The deer population on the Refuge is currently at a healthy carrying capacity. Under all alternatives, especially Alternatives 2 and 3, forest management actions could increase the deer population. The Refuge's forests and adjacent croplands provide rich sources of forage for deer. Under all alternatives, deer populations would be monitored and hunting would be used to manage their numbers in order to provide a compatible recreational activity and prevent habitat damage. Hunting would also ensure the health of the deer herd and minimize the effects to other wildlife species and habitat.

Feral hogs are an issue that must be addressed under all alternatives. The feral hog is a nonnative, nuisance species that directly competes with native wildlife for food (especially white-tailed deer), destroys habitat and habitat improvements (e.g., levees and food plots), and negatively affects the habitat and nests of ground-dwelling species. Under all alternatives, feral hog populations would be controlled by hunting, trapping, and other nuisance animal control techniques.

An integrated pest management plan would be developed under all alternatives. Alternative 1 would provide the least management, while Alternatives 2, 3, and 4 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 an as-needed basis.

Alternatives 2 and 3 describe actions that address the 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 2 and 3 would also protect landscape characteristics such as habitat connectivity and would provide sufficient proprietary interest in properties to restore habitats for forest interior breeding birds. Alternative 2 will provide protection through prioritizing forested corridors that would contribute to the 100,000-acre forest blocks and through working with partners to protect these lands. Alternative 3 would provide protection by expanding the acquisition boundary in priority areas so that the Service would manage and protect more land. Alternatives 2 and 3 would have the potential for providing the most protection and conservation, while Alternatives 1 and 4 would provide the least. Alternative 2, through identification and prioritization, protects lands through State, private, and Federal partnerships. Alternative 2 also relies on partners to provide protection for connectivity of corridors. Alternative 3 will protect those lands through expansion of Service acquisition. Alternative 3 would generate the greatest conversion of cropland to forest.

PHYSICAL ENVIRONMENT

Alternatives 2 and 3 address regional climate change and biodiversity through reforestation. Each would affect the microclimatic conditions within the existing Refuge boundary, and Alternative 3 would affect the proposed Refuge expansion area and immediate surroundings. Alternative 4 would provide the least biomass protection and Alternatives 2 and 3 would provide the greatest to offset the harmful effects of carbon dioxide released into the atmosphere. Because of extensive reforestation and subsequent increase in biomass and decrease in agricultural activities, air quality should improve from current levels under all alternatives.

All alternatives would positively affect 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 and in areas targeted for forest management, cropland, and moist-soil management practices.

Each alternative would protect the natural hydrology of the affected areas. Alternatives 1, 2, and 4 would provide the least protection, while Alternative 3 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 affect the water quality in individual lakes and bayous. Other positive effects 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. Forest management activities designed to improve forest composition and structure would be carried so as to minimize any short-term aesthetic effects.

RECREATION, INTERPRETATION, AND ENVIRONMENTAL EDUCATION

Under all alternatives, the level of recreation use and ground-based disturbance from pedestrians would be largely concentrated at boardwalks, trails, and the Refuge's office and maintenance areas. This, combined with dispersed activities including hunting, could have a negative effect on nesting bird populations. It is unlikely that bald eagles would establish nests near developed facilities or during the hunting season.

Under Alternatives 2, 3, and 4, big game hunting, fishing, wildlife observation and photography, and environmental education and interpretation opportunities would increase. Under each alternative, most of the newly acquired lands would be opened for public hunting, resulting in a net gain of public hunting opportunities in the area. Alternatives 2, 3, and 4 would also stimulate ecotourism and potentially increase tourism expenditures in the surrounding local communities.

The number of hunting days as well as hunters may vary depending upon Refuge acreage and populations of deer and other game species. The opportunities for hunting would expand under all alternatives, but more significantly under Alternative 3 due to the expanded acquisition boundary. High deer numbers are recognized as a problem causing crop damage, reducing some forest understory species, and reducing reforestation seedling survival. Therefore, the deer hunting program would be expanded as the Refuge acquires additional acreage and the deer population responds to reforestation and Refuge management. Hunting would be used to keep the deer herd in balance with the habitat's carrying capacity.

The Refuge would control access under all alternatives to minimize wildlife disturbance and habitat degradation, while allowing compatible wildlife-dependent recreation. Some areas, such as waterfowl sanctuaries, would be closed seasonally to all public entry to minimize disturbance to wintering waterfowl. Visitor access would increase in Alternatives 2, 3, and 4, where foot trails, boardwalks, and wildlife viewing platforms would be developed.

Visitor use management on Refuges concentrates on the experience, not the number, of people coming into a Refuge. The types and intensity of visitor activities would vary from tract to tract depending on each tract's size, habitat type(s), and wildlife uses. Because much of the land in Avoyelles 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 public access would become available.

SOCIOECONOMIC ENVIRONMENT

The wildlife-dependent recreational activities described under Alternatives 2, 3, and 4 (i.e., expanded opportunities for hunting, fishing, wildlife observation and photography, and environmental education and interpretation) would increase visitation to the Refuge and generate greater purchases of local goods and services in the economy of the surrounding communities. An estimated 10,000 Refuge visits were reported in 2000.

Refuge visitation to support priority public uses would generally build over time as Refuge lands are acquired, visitor service facilities are developed, and operational funds are provided. Initially, much of the public use on the Refuge is expected to come from local, parish, and State residents, although an increase in the number of spring and fall tourists is predicted for fishing, hiking, and wildlife observation. The number of visitors would depend on the season and would grow as the Refuge land base increases and more public use programs are provided.

Many of the wildlife-dependent recreational activities offered have yet to be discovered by local citizens. As a generator of economic benefits, each alternative identifies hunting, birding, and wildlife observation as important tourist attractions. Under Alternatives 2, 3, and 4, road improvements and development of wildlife-dependent recreational facilities and programs would lead to the greatest economic benefit from increased tourism.

Each alternative would decrease the gross property tax revenues of Avoyelles Parish. However, there would be an increase in Refuge revenue-sharing payments. Because the Service is a Federal agency, it is not subject to State and local taxes. Under the Refuge Revenue Sharing Act, the Fish and Wildlife Service makes annual payments to Avoyelles Parish to offset the loss of property tax revenues. These annual Refuge revenue-sharing payments for owned and acquired lands are computed on whichever of the following formulas yields the highest result: (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. The Refuge Revenue Sharing Act also requires that Service lands be appraised every five years to ensure that payments to local governments remain equitable. In 2000, Avoyelles Parish received a revenue-sharing payment of $24,654 for 17,326 acres at Lake Ophelia National Wildlife Refuge.

Recent trends demonstrate a decline in Federal farm subsidies for crop production. Crop prices nationwide have declined as well. As a result, real estate trends demonstrate a marked increase in farmland sales. Wildlands have also been declining nationwide. Each alternative advocates the Service acquiring additional lands in Avoyelles Parish for wildlife conservation and wildlife-dependent recreation. Historically, lands adjacent to Refuges have increased in value as the real estate market realizes the value of improved habitat and wildlife populations on Refuge.

EFFECTS COMMON TO ALL ALTERNATIVES

HEALTH AND SAFETY EFFECTS

None of the four alternatives would have a significant effect on public health and safety. The only potential safety problems involve the possibility of motorized vehicle accidents occurring on the Refuge's roads and trails, and accidents occurring during the hunting season, when Refuge user groups might be affected. As indicated below in the mitigation/minimization section, time and space zoning has been used successfully on national wildlife Refuges to minimize the potential for accidents and conflicts between hunters and other Refuge user groups.

REGULATORY EFFECTS

As indicated in the Background section of the Comprehensive Conservation Plan, the Service must comply with a number of federal laws, administrative orders, and policies in the development and implementation of its management actions and programs. Among these mandates are the Endangered Species Act of 1973 and compliance with Executive Orders 11990 (Protection of Wetlands) and 11988 (Floodplain Management). The implementation of any of the four alternatives described in this environmental assessment would not lead to a violation of these or other mandates.

CULTURAL AND HISTORIC RESOURCES EFFECTS

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

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

Land acquisition by the Service would provide some degree of protection to significant cultural and historic resources. If acquisition of private lands does not occur and these lands remain under private ownership, the landowner would be responsible for protecting and preserving cultural resources. Development of off-Refuge lands has the potential to destroy archaeological artifacts and other historical resources, thereby decreasing opportunities for cultural resource interpretation and research. There is no designated wilderness area within the Refuge.

UNCERTAINTY OF FUTURE ACTION EFFECTS

In general, one of the components of each alternative is the inventory and monitoring of fish and wildlife populations on the Refuge. Once this information is known, the Service will develop detailed step-down

management plans to manage the fish and wildlife populations on the Refuge, based on the application of sound fish and wildlife management principles and concepts. Therefore, the alternatives do not present highly uncertain environmental risks to the human environment. Further, the alternatives will not establish a precedent for future actions with significant effects.

CUMULATIVE EFFECTS

Cumulative effects on the environment result from incremental effects of a proposed action when these are added to other past, present, and reasonably foreseeable future actions. While cumulative effects may result from individually minor actions, they may, viewed as a whole, become significant over time.

The implementation of any of the four alternatives described in this document includes actions relating to site development, fish and wildlife habitat and population management, land acquisition, and recreational use programs. These actions would have both direct and indirect effects (e.g., site development would result in increased public use, thus increasing littering, noise, and vehicular traffic); however, the cumulative effects of these actions over the 15-year planning period are not expected to be significant.

MITIGATION MEASURES

Described below are the measures used to mitigate and minimize the potential adverse effects.

Wildlife Disturbances

Disturbance to wildlife at some level is an unavoidable consequence of any public use program, regardless of the activity involved. Obviously, some activities innately have the potential to be more disturbing than others. All of the proposed alternative public use activities contained in this document have been carefully planned to avoid unacceptable levels of impact.

As currently proposed, the known and anticipated level of disturbance of the proposed alternative (Alternative 2) is not considered significant and is well within the tolerance level of known wildlife species and populations present in the area. Implementation of the proposed public use program would take place through carefully controlled time and space zoning, including the management of waterfowl sanctuary areas, the establishment of protection zones around key sites such as rookeries and eagle nests (if necessary), the seasonal closure of most all-terrain vehicle trails, and the routing of roads and trails to avoid contact with sensitive areas such as rookery habitats, etc. In addition, restrictions on all public hunting activities (season lengths, bag limits, number of hunters) would be set in accordance with sound biological principles and Refuge-specific regulations established to restrict illegal or non-conforming activities. Providing fishing opportunities would allow the use of a renewable natural resource without adversely impacting other resources.

General wildlife observation/photography activities may result in minimal disturbances to wildlife. If visitors venture too close to foraging wading birds, alligators or other wildlife, disruption of foraging or resting activities could result in more severe disturbances. To mitigate these potential disturbances, all visitor trails and observation points will be constructed with a buffer around key wildlife forage and resting areas, and the visitors will be educated through signs and brochures to avoid disturbing wildlife. Also, any area on the Refuge may be closed to the public if disturbance becomes excessive.

Temporary initial disturbances to wildlife and habitat will occur during the construction of new facilities such as outdoor classrooms, wildlife observation platforms, boat ramps, and interpretive sites. However, once the construction of such facilities is completed, the experience gained by the public will offset these

disturbances. Allowing these non-consumptive recreational opportunities on the Refuge will help to maintain and build public support for the Refuge and the Red River/Three Rivers ecosystem.

Monitoring activities through wildlife inventories and assessments of public use levels and activities would be utilized, and public use programs would be adjusted as needed to limit disturbance to acceptable levels.

User Group Conflicts

As public use levels expand across time, unanticipated conflicts between user groups may occur. The Refuge's visitor use programs would be adjusted as needed to eliminate or minimize each problem and provide quality wildlife-dependent recreational opportunities. Experience has proven that time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) is an effective tool in eliminating conflicts between user groups.

Effects on Adjacent Landowners

Implementation of the proposed action would not impact adjacent or inholding landowners. Essential access to private property would be allowed through the issuance of special use permits. Future land acquisitions would occur on a willing-seller basis only and at fair market values. In addition, the proposed Comprehensive Conservation Plan will conduct water quality sampling and monitoring activities to document current conditions and seek to improve the water quality, if necessary. Existing State water quality criteria and use classifications are adequate to achieve desired on-Refuge conditions; thus, implementation of the proposed alternative would not impact adjacent landowners or users beyond the constraints already implemented under existing State standards and laws.

Land Ownership and Site Development

Proposed land acquisition efforts by the Service would result in changes in land and recreational use patterns, since all uses on national wildlife Refuges must meet compatibility standards. Land ownership by the Service also precludes any future economic development by the private sector on these lands.

Potential development of access roads, buildings, trails, dikes, water control structures, visitor parking areas and other improvements could lead to minor short-term negative impacts on plants, soils, and some wildlife species. When site development activities are proposed, each activity would be given the appropriate National Environmental Policy Act consideration during pre-construction planning. At that time, any required mitigation activities, if necessary, would be incorporated into the specific project to reduce the level of impacts to the human environment and to protect fish and wildlife and their habitats.

As indicated earlier, one of the direct effects of site development is increased public use; this increased use may lead to increased littering, noise, and vehicle traffic. While Service funding and personnel would be allocated to minimize these indirect effects, such allocations would make the resources unavailable for other programs.