IV. ENVIRONMENTAL CONSEQUENCES

Overview

This chapter analyzes the direct, indirect, and cumulative environmental impacts of the three alternatives described in Chapter II. Outlined are the predicted impacts that could result from the implementation of proposed actions described in Alternatives 1, 2, and 3. Each alternative portrays expected outcomes for fish and wildlife species, varying in magnitude to the amount of land proposed to be acquired and the intensity of management. Alternative 1, the "no action" alternative, represents a continuation of current management practices; it serves as the baseline against which Alternatives 2 and 3 are compared.

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Analyses of impacts related to human presence on the refuge assume that overall use would increase slightly as population in the surrounding counties grows. Hunting and fishing use is expected to increase less rapidly than non-consumptive uses (environmental education and interpretation, wildlife observation) and may remain stable because these uses already are permitted on most of the refuge.

Effects Common to All Alternatives

The three alternatives were developed to address the issues, concerns, and opportunities identified during the planning process. Many of the predicted impacts are common to the alternatives.

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 wilderness character (undisturbed bottomland hardwood forest) in the wilderness study area. Implementation of all alternatives would benefit and not likely adversely affect threatened or endangered species or habitats.

Overall, refuge foraging habitat would remain stable for waterfowl under all alternatives. Each alternative would protect sites important to neotropical migratory birds and populations of the red-cockaded woodpecker.

Logging and recreation activities including hunting, fishing, and small fishing craft can be a disturbance to bald eagles and colonial nesting birds. Hunting is primarily a winter season activity.

Logging and recreation activities would be located to minimize disturbance to bald eagles and colonial nesting birds. Larger numbers of people on the refuge during the winter months and hunting season can cause increased impacts. However, without the use of hunting as a management tool, increased deer browsing would greatly impact area-sensitive forest birds.

Old growth and old-aged trees are extremely rare in the Central Gulf Ecosystem. Under all alternatives, the refuge would fully protect existing old growth or old-aged timber from timber harvests. Timber harvesting to benefit wildlife is covered under each alternative, however, the harvest is always done in young or intermediate-aged stands (i.e., 15-80 years old).

All alternatives include deer population control through a hunt program. The deer population on the refuge is currently at a healthy carrying capacity and forest management practices under all alternatives could increase the deer population. Refuge forests and adjacent forests and croplands provide rich sources of forage for deer. 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.

Integrated pest management strategies would be implemented under all alternatives. Alternative 1 would provide the least management, while Alternatives 2 and 3 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.

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 minimization of non-point source pollution.

Under all alternatives, the level of recreation use and ground based disturbance from pedestrians would be largely concentrated to the boardwalks, trails, and refuge facilities.

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 size, habitat type(s), and wildlife uses.

Wildlife-dependent recreation under all alternatives supports slight increases in economic activities. Economic benefits from the increased visitation should directly improve the value of goods and services to local communities. Portions of the refuge may be closed occasionally because of the sensitivity of habitat and its importance to nesting birds.

Under all alternatives, refuge visitation to support priority public uses would generally increase over time as funding is provided for

operation, maintenance, and facilities. Much of the refuge usage is expected from local, county, and state residents, although an increase in the number of spring and fall tourists is predicted for bird watching.

Environmental impacts by resource or management area are outlined in the following pages.

Biological Resources

Under Alternative 1, continuation of current management activities would have beneficial impacts on wildlife, including endangered species. For example, emphasis would be placed on forest breeding birds where management is designed to maintain late successional forest stands. Species such as the red-cockaded woodpecker and the Bachman's sparrow should demonstrate significant increases in population due to forest management practices. Annual management of water levels in moist-soil units would continue to result in an abundance of seeds, insects, crustaceans, and mollusks, all of which are favored foods of migratory waterfowl, wading birds, and shorebirds. Flooding of greentree reservoirs provides favorable waterfowl and wading bird habitat. Continued burning in old-aged loblolly pine stands would provide beneficial impacts to support red-cockaded woodpeckers.

Localized disturbance of wildlife would occur when timber is cut or vegetation is removed. Timber management is the most effective means to modify wildlife habitat on a large scale. Generally, higher timber production in Alternative 3 would produce a younger forest and favor those species that thrive in early seral stages.

Alternatives 1 and 2 favor a higher percentage of mid- and late-seral stages, which results in higher numbers of cavity nesters. All alternatives provide for an old growth component to meet the needs of red-cockaded woodpeckers.

There would be no effect on fishery resources under Alternative 1.

Under Alternative 1, the current control of invasive species would have a beneficial impact on native habitats. Without invasive species control, the refuge wildlife populations could be adversely affected by exotic and invasive species.

Recreational use of the refuge is expected to gradually increase as the population of this region grows. Roosting birds may be flushed by increased public use (i.e., visitors, hunters, and fishermen). Disturbance by visitors may limit bald eagle use, and visitors who walk off trails may disturb ground nesting birds, reptiles, and amphibians.

Limited waterfowl hunting opportunities would continue to be available under Alternative 1, and could result in several types of disturbances to wildlife. Hunters accessing the hunt area may disturb wildlife in the refuge's riparian and aquatic habitats, and hunters may accidentally take non-target species. In addition, litter discarded by hunters and other refuge users could be ingested or entangle wildlife, resulting in injury or death.

Implementation of Alternative 2 would result in numerous beneficial impacts and potentially some adverse impacts on wildlife. Management actions would have a beneficial impact on wildlife including red-cockaded woodpeckers in mature and old-aged loblolly pines. Under this alternative, predators of the red-cockaded woodpecker would continue to be managed. As a result, the fledge rate is expected to increase. In addition, restricted access to nesting habitat and education of refuge visitors about the species would continue to reduce impacts to this species. Alternatives 1 and 2 provide the highest degree of vegetative age and type diversity adding to ecosystem heterogeneity.

Under Alternative 2, the increased presence of Service staff on the refuge may also deter illegal activities, such as underage drinking, littering, and night-time disturbance, which would benefit wildlife. Additions and improvements to education and recreation facilities, including trails, would have minimal direct impacts because these facilities already exist. However, the construction of a new visitor center and office complex would bring more visitors closer to Bluff and Loakfoma lakes, potentially increasing disturbance to waterfowl, other birds, and alligators that use the lakes.

Under Alternatives 2 and 3, visitor use of the refuge would gradually increase as the improved facilities are utilized and program activities are implemented. For example, the refuge's improved interpretive displays and wheelchair accessible fishing facilities would likely attract slightly more users than would visit under Alternative 1. Therefore, implementation of Alternatives 2 and 3 may have adverse effects on fish and wildlife species as compared to Alternative 1. This increase would be controlled through a combination of more enforcement of user restrictions (through greater presence of refuge staff) and facilities to better control public use. Improved access to and through the refuge would likely increase the number of users. This would have adverse impacts on wildlife near viewing areas, facilities, lake shorelines, and trails. Greater numbers of walkers and children playing may increase disturbance. Construction of the proposed visitor center adjacent to Loakfoama Lake would take place between 2002 and 2004. Construction and annual movement along the lake could adversely affect wildlife on the lake. However, Alternative 2, overall, should have beneficial impacts to wood ducks, mallards, late-succession neotropical migratory birds, and native game fish.

Physical Resources

None of the activities proposed under Alternatives 1, 2, and 3 would have an adverse effect on local hydrology.

Under all alternatives, non-native vegetation would be removed from the refuge. Removal would be accomplished through a combination of chemical and mechanical means, including herbicide spraying, prescribed burning, and use of heavy equipment. Removal would be carried out at times to avoid adversely affecting nesting and breeding seasons. Depending on the terrain, surfaces

exposed by vegetation removal could erode and increase sediment loss until vegetation recovers.

Herbicides would usually be applied by hand to target exotic plants; and be applied by aerial spraying only when necessary and practical, such as when treating American lotus. There could be adverse impacts on non-target plants from pesticide drift, but these effects are expected to be minimal due to the small quantities that would be used and the precautionary methods that would be taken. Herbicides would be selected based on the characteristics of each treatment site and location relative to aquatic and wetland habitats. No spraying would take place when wind velocities exceed 5 mph, when vegetation is wet, or when precipitation is forecast in the following 24-36 hours. No spraying would occur in areas where endangered plants or animals occur. Invasive non-natives in these areas would be mechanically removed.

Alternatives 2 and 3 include building or improving visitor facilities to improve access throughout the refuge as well as education and interpretation opportunities. Site preparation and construction activities associated with boardwalk installation could increase delivery of sediment to local wetlands. This increase in sediment delivery is expected to be temporary and small because the terrain is flat. Therefore, construction would not significantly affect water quality.

Improving roads and parking lots could increase runoff of oil and grease during storms. Although adverse, this reduction in water quality is not expected to be significant because the flat terrain slows runoff rates, and the roads and parking lots are very small relative to the size of the watershed.

None of the activities proposed under any of the alternatives would change drainage patterns on the refuge.

Under all alternatives, continuation of current refuge farming and logging practices would result in some soil erosion and compaction. Timber is usually harvested using power saws, rubber-tired articulated skidders, and mechanical loaders. The wood is trucked off the refuge for processing. A temporary increase in localized soil movement can be expected due to vegetation removal and use of logging equipment. Soil nutrient losses would be negligible in terms of long-term productivity. Major nutrient losses are caused by erosion resulting from site preparation. Timber harvesting activities, including site preparation using fire, mechanical, or hand methods to reduce hardwood competition, may result in soil compaction and short-term loss of soil productivity.

All alternatives would use prescribed burns to control non-native vegetation and the spread of woody vegetation in the pine and grassland habitats. The prescribed burn program is outlined in the Fire Management Plan for the refuge. This plan describes the year's burn unit(s) and their predominant vegetation; the pri-

mary objectives of the unit(s) and the fire(s); the acceptable range of results; site preparation requirements; weather requirements; safety considerations and measures to protect sensitive features; burn-day activities; communications and coordination for burns; ignition techniques; smoke management procedures; and post-burn monitoring.

Prescribed burning temporarily reduces air quality by reducing visibility and releasing several components through combustion. The four major components are carbon monoxide, carbon dioxide, hydrocarbons, and particulates. Varying amounts of particulate content are generated in different types of burns (e.g., wildlife habitat improvement burns vs. fuel reduction burns). Clean Air Act standards would be met during all prescribed burns under all alternatives.

Under Alternatives 2 and 3, the Service would build or improve several facilities, generating construction-related vehicle emissions. Implementation of Alternatives 2 and 3 may result in increased vehicle-related emissions. Visitor use is expected to increase if the office/visitor center and additional phases of the education center are built. However, the corresponding increase in vehicle traffic would be limited to current roads and facilities. Likewise, tour groups and planned visitor activities would be limited to the visitor center and environmental education center parking areas. Increased vehicle emissions under Alternatives 2 and 3 are not expected to have a significant impact on air quality of the refuge.

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Social and Economic Resources

The forest management program has a very direct impact on the local economy. To accomplish needed habitat management, the refuge will typically thin about 200-600 forest acres per year. Likewise, approximately 100-200 acres are harvested per year to regenerate new stands of trees. Sometimes additional timber harvests occur to salvage trees damaged by storms or southern pine beetle infestations. Collectively, these timber harvests often amount to more than a million board feet of sawtimber and several thousand cords of pulpwood per year. The value of these raw products is several hundred thousand dollars per year. Timber harvests not only provide raw material for regional saw mills and pulp mills, they also provide employment for local loggers, foresters, etc. Alternatives 1 and 2 would have no effect on the local economy as far as forest management activities are concerned. Alternative 3 should have a positive effect due to increased timber harvest.

None of the alternatives would have an adverse effect on local agricultural operations.

Under Alternative 1, visitor use is not expected to show an increase greater than that expected at present. Thus, under this alternative, there would be no adverse impact on local traffic or transportation systems. Under Alternatives 2 and 3, visitor use is expected to increase slightly because of improved access and additional facilities. This increase would generate a small amount of additional traffic to the refuge, however, it would not be significant.

Implementation of Alternative 1 would maintain current refuge recreational uses and would have no impact on existing recreation.

Implementation of Alternatives 2 and 3 may have several beneficial impacts on enhancing hunting, fishing, wildlife observation, and environmental education and interpretation opportunities. Current refuge operations would be maintained with increases in the number of hunters and fishermen, but would have greater positive effects on the experience of refuge visitors other than hunters and fishermen. Visitor access for education and interpretation would improve. Additional facilities, including a visitor center and disabled access, would provide greater opportunities and encourage more people to visit, which would have a positive impact on recreation. Increased public use will benefit local economies with increased spending on lodging, food, fuel, and other needs of visitors.

Under Alternative 1, current management practices would continue to be followed and no change in refuge staffing would be required, thus having no impact on local employment conditions.

Under Alternatives 2 and 3, current management practices would continue, but natural resource and public use management would be increased. This would require the Service to increase the staff of the refuge by 12 positions. In addition, visitation would be expected to increase under Alternatives 2 and 3. This increase could benefit the local economy and local employment conditions. Alternatives 2 and 3 could thus result in a small positive impact on local employment conditions.

No activities proposed in any of the alternatives would have a disproportionate negative impact on low-income or minority populations.

No activities proposed under Alternatives 1, 2, and 3 would have a negative impact on the economic well-being of the local community. Alternative 3 would have beneficial impacts on the local economy by providing additional revenues from increased timber sales, and if the expected additional visitors patronized local businesses.

Cultural Resources

No comprehensive cultural resource surveys have been conducted on the refuge, although there have been limited compliance surveys prior to construction projects and land exchanges. Ground-disturbing activities and use of prescribed fire could result in adverse impacts to any cultural resources that may be present.

All of the alternatives incorporate ground-disturbing activities. They have the potential to disturb cultural resources. The nature and degree of the impacts would depend on the specific activities undertaken, the nature of the resources present, the nature of previous management activities on the site, and the severity of any previous impacts. All ground-disturbing activities would require review by the Service's Regional Archaeologist, who would determine appropriate procedures to protect cultural resources and

would specify any necessary mitigation, guided by the State Historic Preservation Office.

All alternatives afford additional land protection and low levels of development, thereby producing little negative effect on cultural resources. Potentially negative impacts could include logging, prescribed burning, constructing new facilities and parking areas, and maintaining water impoundments. In most cases, these management actions would require review by the Regional Archaeologist and consultation with the Mississippi 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 during the planning stages of every project.

As required by the Native American Graves Protection and Repatriation Act, any construction or ground-disturbing activity with the potential to disturb human remains, burial objects, sacred objects, or objects of cultural patrimony would be planned and implemented in consultation with the affected tribes.

Unavoidable Adverse Impacts
The selection of any alternative would have no unavoidable adverse impacts, either direct or indirect, on the environmental parameters evaluated in this chapter, including biological resources. Adverse effects identified in this chapter have been reduced to the maximum extent possible.

Irreversible and Irretrievable Commitment of Resources
Most management actions identified in this document would require a commitment of funds that would be unavailable for use on other Service projects. At some point, commitment of funds to these projects would be irreversible, and once used, would be irretrievable. Non-renewable or non-recyclable resources committed to projects identified in this plan, such as fuel for refuge vehicles or supplies used in management or maintenance activities (e.g., herbicide, signs, buildings, etc.), would also represent an irreversible and irretrievable commitment of resources.

Short-Term Uses Versus Long-Term Productivity
An important goal of the National Wildlife Refuge System is to maintain the long-term ecological productivity and integrity of biological resources on national wildlife refuges. This system-wide goal is the foundation for the goals presented in this plan. Compared to Alternative 1, Alternatives 2 and 3 attempt to balance issues by providing some short-term uses (i.e., education and recreational opportunities), while fostering the long-term productivity of biological resources.

V. CONSULTATION AND COORDINATION

The team responsible for leading the comprehensive conservation planning effort included Service staff from the Noxubee National Wildlife Refuge and staff from the Service's Regional Office in Atlanta, Georgia. Figure 19 lists the members of the planning team. The planning team considered the interest and expertise of the Mississippi Department of Wildlife, Fisheries, and Parks, as well as many other agencies and organizations.

Figure 19. Comprehensive Conservation Planning Team for Noxubee National Wildlife Refuge.

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Rose Hopp, Ascertainment Biologist-Planner
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CHAPTER V -

Consultation and Coordination