

II. REFUGE DESCRIPTION

Introduction

Noxubee National Wildlife Refuge is located within three counties (Noxubee, Oktibbeha, and Winston) in east-central Mississippi, approximately 17 miles south-southwest of Starkville and approximately 80 miles north-northeast of Jackson. Primary access to the refuge is by either Oktoc Road from Starkville, or by Highway 25 via Loakfoma Road and Brooksville/Louisville Road (Fig. 2).



USFWS Photo

Refuge History

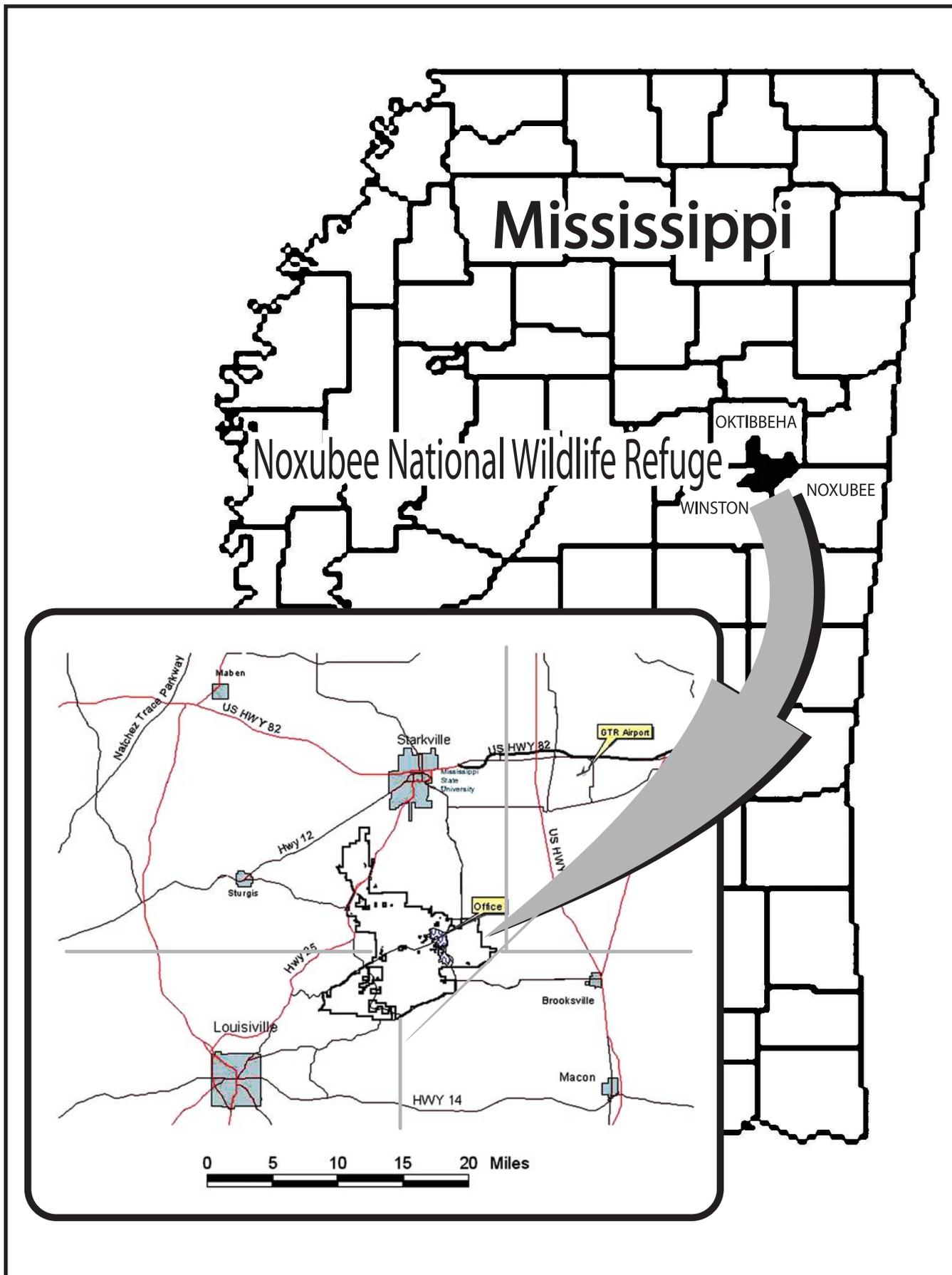
The refuge was established in 1940 from lands acquired through the 1930s Resettlement Administration. Initially, it was established by Executive Order 8444 on June 14, 1940. This order reserved lands acquired by the Rural Resettlement Administration as a refuge and breeding ground for migratory birds and other wildlife. On January 27, 1944, Public Land Order 205 modified the refuge boundary by adding lands thought to be suitable for wildlife, and eliminating land requested by the Soil Conservation Service.

Another similar modification occurred in 1947 (Public Land Order 401). Since those initial acquisitions, most land acquired by the refuge has been by exchange, under the authority of Title III of the Bankhead-Jones Farm Tenant Act. A smaller amount of land has been acquired by purchase, under the authority of the Migratory Bird Conservation Act of 1929 (45 Stat. 1222). Currently, the refuge owns 47,049 acres within the 56,451-acre approved acquisition boundary, leaving over 8,000 acres in private ownership.

Prior to government ownership, the land area within the present refuge boundary was intensively farmed and over-grazed by cattle. Today, after 50 years as a national wildlife refuge, the area has seen a return of bountiful wildlife populations and a progression towards restoration of the pine and hardwood forest types that were eliminated in the late 1800s and early 1900s.

Approximately 42,500 acres of the refuge are bottomland hardwood, upland hardwood, mixed pine/hardwood and pine forests. These forest lands are occupied by a variety of upland species including turkey, deer, and quail. The endangered red-cockaded woodpecker relies on old growth pine habitat managed by the refuge for its survival. In addition, many neotropical migratory bird

Figure 2. Noxubee National Wildlife Refuge Location



Noxubee
National Wildlife Refuge

Section A.
Final Comprehensive
Conservation Plan

CHAPTER II -
Refuge Description

species greatly benefit from the refuge forests. Four greentree reservoirs, two major lakes, numerous natural ponds, and sixteen man-made impoundments provide important habitat for other migratory birds, including wintering habitat for waterfowl and bald eagles.

More than 150,000 visitors participate in several activities each year including fishing, hunting, hiking, wildlife photography, wildlife observation, and environmental education and interpretation. The refuge serves as an outdoor classroom for Mississippi State University, Starkville City School District, and other local educational institutions.

Refuge Purpose

The primary establishing legislation for the refuge was Executive Order 8444, dated June 14, 1940, with the stated purpose "...as a refuge and breeding ground for migratory birds and other wildlife...." 16 U.S.C., 715 (Migratory Bird Conservation Act).

"...conservation, management, and restoration of the fish, wildlife, and plant resources and their habitats for the benefit of present and future generations of Americans." 16 U.S.C., 668dd(a)(2) (National Wildlife Refuge System Administration Act).

"...for the development, advancement, management, conservation, and protection of fish and wildlife resources...." 16 U.S.C., 742f(a)(4).

"...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude...." 16 U.S.C., 742f(b)(1) (Fish and Wildlife Act of 1956).

Subsequently, a small amount of land purchased with Migratory Bird Conservation Stamp monies held the following purpose "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C., 715d (Migratory Bird Conservation Act).

Refuge Environment

Biological Resources

The rich variety of habitats on the refuge provide for a wide diversity of fish and wildlife species. At least 254 species of birds; 47 mammals; 34 reptiles; 23 amphibians; 25 fish; and untold numbers of invertebrates inhabit the refuge. Migratory birds move with the changing of the seasons. In the spring, as most waterfowl leave the refuge for their northward migration, thousands of neotropical migratory birds begin to arrive from their wintering grounds in Central and South America. The majority will continue north after replenishing their energy reserves, but many, such as the prothonotary warbler, great-crested flycatcher, and summer tanager use the refuge for nesting. A list of bird species known to inhabit the refuge is included in Appendix D.

Section A.
Final Comprehensive
Conservation Plan

CHAPTER II -
Refuge Description



Red-cockaded woodpecker
USFWS Photo



Bachman's sparrow
USFWS Photo

Threatened and Endangered Species

The red-cockaded woodpecker, bald eagle, and wood stork are listed as either threatened or endangered and each utilize the refuge. The endangered red-cockaded woodpecker is a resident species and many of the refuge's management programs are directed toward its survival. This small resident bird has disappeared over large portions of its former range in the southeastern United States due to the suppression of natural fires and over-cutting of pine forests. This bird requires precise conditions within mature pine forests with very open understory managed by frequent fires. The threatened American bald eagle is sighted on a regular basis from November through February. The golden eagle is occasionally seen during this period. The wood stork is a state-listed species commonly sighted during the late summer months when the lakes are drawn down. Price's potato-bean is a federally listed threatened plant that may occur on the refuge. While it has been found in Oktibbeha County, no populations have been documented on the refuge (Price's Potato-bean Recovery Plan 1993). Six species of endangered freshwater mussels (i.e., southern clubshell, Judge Tait's, penitent, Alabama moccasinshell, orange-nacre mucket, ovate clubshell) have been found in streams and rivers near the refuge, and there is a possibility that these species may occur on the refuge.

The most diverse vertebrate group found in the ecosystem is birds, with at least 254 species, most of which are forest-dwelling to some degree. Songbirds are found throughout refuge habitats, with some of the most noticeable species being pine warblers, prothonotary warblers, common yellowthroats, white-eyed vireo's, Bachman's sparrows, cardinals, wood thrushes, and brown-headed nuthatches. Priority migratory neotropical bird species identified as special management concern by the Partners-In-Flight Plan and found on the refuge are listed in Figure 3. Game birds such as eastern wild turkey and bobwhite quail are found on the refuge.

Waterfowl

Many birds are seen in the refuge's wetlands. About 18 waterfowl species utilize the refuge and receive significant management attention. Mallards, wood ducks, ring-necked ducks, and Canada geese make up the bulk of the waterfowl found on the refuge, with populations peaking in winter, sometimes up to 15,000. At this time as many as 300 migrating geese join the 600 resident giant Canada geese on the refuge.

Wading Birds

Large numbers of wading birds are present, including wood storks, great and little blue herons, little green herons, great and snowy egrets, and a large nesting colony of cattle egrets. Two rookeries are established on the refuge—one that contains five thousand breeding pairs of cattle egrets plus snowy egrets, little blue herons, and white ibis, and one that contains several hundred great blue herons and great egrets.

Noxubee
National Wildlife Refuge

**Section A.
Final Comprehensive
Conservation Plan**

**CHAPTER II -
Refuge Description**

Raptors

Common raptors include red-shouldered, Cooper's, red-tailed, and sharp-shinned hawks; barred owls; both black and turkey vultures; and occasionally Mississippi kites. Bald eagles are winter residents of the refuge, and a nesting pair was discovered in 2003. Golden eagles are occasionally spotted on the refuge, as are peregrine falcons.

Mammals

Of the 47 mammal species found on the refuge, the most prominent and abundant is the white-tailed deer. The refuge places considerable management effort on controlling its population. Other common mammals include beavers, gray and fox squirrels, swamp and eastern cottontail rabbits, grey foxes, coyotes, and several species of small rodents such as mice, rats, and voles. Surprisingly, one of the most diverse groups of mammals is bats with seven species likely to occur on the refuge.

Reptiles

Thirty-four reptile species are known to occur on the refuge and the largest and most notable is the alligator. The most common snakes are black racers, gray rat snakes, Western cottonmouths, and several species of water snakes. Common lizards include four species of skinks, Carolina anoles, and Northern fence lizards. Turtle species include red-eared sliders, river cooters, common and alligator snapping turtles, and three-toed box turtles.

Figure 3. Priority Migratory Neotropical Bird Species found at Noxubee National Wildlife Refuge

Highest Priority Species	Refuge Habitat
Bachman's sparrow	Open pine/oak forest; palmetto scrub; bushy pastures
Red-cockaded woodpecker	Open pine forests
Swainson's warbler	Swamps; bottomland hardwood forests
Brown-headed nuthatch	Open pine forests
Kentucky warbler	Forest undergrowth
Northern bobwhite quail	Fields; brushy open areas; roadsides; forest edge
Orchard oriole	Forest edges and clearings
Prairie warbler	Brushy slashings; bushy pastures; low pines
Prothonotary warbler	Forest swamps
Red-headed woodpecker	Forest edges; open pine woods; tall deciduous trees
Chuck-will's-widow	Pine forests; bottomland hardwood forests
Worm-eating warbler	Dense deciduous forests
Yellow-billed cuckoo	Forests; thickets; forest edges

Species occurrence based on point count surveys conducted by Chris Reynolds, Mississippi State University 1999.

Section A.
Final Comprehensive
Conservation Plan
CHAPTER II -
Refuge Description



American alligator hatchlings
USFWS Photo

Amphibians

Thirty-four species of amphibians are known to occur on the refuge, the largest of which is the three-toed amphiuma. Several species of salamanders, including the marbled and slimy, are commonly seen. Frogs and toads such as Spring peepers, bull, green tree, bird-voiced tree, and Fowlers are common on the refuge.

Fish

Bluff Lake, Loakfoma Lake, Ross Branch Reservoir, and the Noxubee River harbor 25 species of fish, of which 5 are primary game species. Popular game fish include several species of catfish, largemouth bass, black and white crappie, and numerous species of bream, redear, and bluegill. Nongame fish include common carp, bowfin, and several species of shiners and darters. The paddlefish is a species of special concern as identified in the Southeast Region's Fisheries and Aquatic Resources Strategic Plan. The fish may have traditionally spawned up Oktoc Creek prior to levee construction and development of Bluff Lake. Annual refuge reports from the 1940s and 1950s indicate that hundreds of these fish were taken in Bluff Lake, possibly a result of fish being impounded by flood events of the Noxubee River.

Habitats

Refuge habitats can be divided into three primary types: Forests; Fields and Grasslands; and Wetlands. Of these types, forests are by far the majority of the habitat totaling 45,186 acres. Fields and grasslands include several forest openings (1-150 acres) and the Morgan Hill prairie restoration area plus utility rights-of-way, all totaling 958 acres. Wetlands (not including bottomland forest habitats) include Bluff and Loakfoma lakes, Ross Branch Reservoir, Noxubee River, Priscock Moist-Soil Management Area, and numerous small streams and ponds scattered throughout the refuge. These wetland habitats total approximately 2,400 acres. Below is a more detailed description of these primary habitat types.

Forests

Ninety-three percent of the refuge consists of forested habitat, with forest types including upland pines (loblolly, shortleaf pine, and a small amount of longleaf); upland hardwoods (white, southern red, and post oaks, black cherry and several hickories); bottomland hardwoods (cherry bark, swamp, overcup, water and willow oaks, beech, box elder, sweetgum, river birch, yellow-poplar, red maple, elm, and sycamore); and mixed pine/hardwood and cypress stands. Refuge forests consist of five primary types: pine; pine/hardwood; upland hardwood; bottomland hardwood; and cypress. About 23,619 acres are dominated by loblolly pine interspersed with shortleaf pine. Pine/hardwood stands total 2,851 acres and are dominantly loblolly pine; however, there is a substantial amount of hardwood species such as oaks, hickories, blackgum and sweetgum. Upland hardwood stands total 3,263 acres and consist primarily of white oak, post oak, southern red oak, and hickory species with dogwood and redbud

common in the understory. Bottomland hardwood stands total 15,308 acres and consist primarily of water, overcup, willow, and cherrybark oak species along with other hardwood species such as American beech, blackgum, and sweetgum. Cypress stands total 145 acres and consist of pure or nearly pure stands of American bald cypress. (See Figure 4 for the current refuge land cover and Figure 5 for forest types and acreages.)

Grasslands

The Morgan Hill area is the only part of the refuge managed as a natural grassland. In 1993, test plots of Indian, switch, and big bluestem grasses were sown in an attempt to restore a representative portion of the Alabama black belt prairie that historically occurred in the area. Historical reports show the area originally consisted of tallgrass prairie interspersed with groves of cedar, oak, and hickory. The area is treated with prescribed fire about every 2 years to control encroachment of woody vegetation.

Wetlands

The majority of wetland habitat on the refuge occurs in Bluff and Loakfoma lakes (1,200 and 600 acres, respectively). Both lakes consist of primarily shallow water habitats (3-12 feet deep) towards their centers with edges that become progressively more shallow. These shallow edges support the bulk of vegetation in the lakes, which consists primarily of emergent species including cattail, smartweed, lotus, and bald cypress. Ross Branch Reservoir (43 acres) is also a man-made impoundment with similar habitat; however, it has slightly deeper water due to its steep banks. Riverine areas comprise the other primary type of wetland habitat found on the refuge (i.e., Noxubee River and its tributaries). During flood events, the Noxubee River and its tributaries can inundate approximately 8,750 acres of the total 14,186 acres of bottomland hardwood forests found on the refuge. Prominent plant species found in aquatic environments include fragrant water lily, American lotus, *Juncus*, swamp smartweed, duckweed, and wild millet.

Refuge Administration and Management

Refuge administration refers to the operation and maintenance of refuge programs and facilities including construction. The refuge has 17 permanent employees and receives substantial assistance from volunteers, college student interns, and Youth Conservation Corps enrollees. The major management activities conducted on the refuge include managing forest areas and water impoundments for migratory birds and wildlife diversity, and providing education and visitor services in support of hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The refuge has an important management partnership with the Starkville School District, each providing environmental education and interpretation at the Noxubee Conservation Center for local children. The refuge and Mississippi State University also have an active partnership. University students and faculty contribute many hours towards conducting investigations and research projects on the refuge.

The refuge also manages the following special designation areas:

- Old Robinson Road Research Natural Area (46 acres of cypress forests);
- Morgan Hill Research Natural Area (67 acres of red cedar/pine/hardwood forests);
- Wilderness Study Area (1,090 acres of bottomland hardwood forests);
- Old Robinson Road National Historic Landmark (approximately 400 acres of various forest types forming a corridor along 1.9 miles of the historic roadway).

These management areas (Fig. 6) possess unique qualities and attributes and are managed according to specific guidance (refer to <http://policy.fws.gov/603fw2.html>, and click on Fish and Wildlife Service Manual for further details).

Special Management Areas

The Wilderness Act of 1964 (Public Law 88-577), required that the Secretary of the Interior review every roadless area of 5,000 acres or more and every roadless island, regardless of size, within the National Wildlife Refuge System, and report recommendations to the President as to the suitability or non-suitability of such areas for preservation as wilderness. The President was then to forward recommendations for wilderness to Congress. The Service (then called the Bureau of Sport Fisheries and Wildlife) completed a wilderness review of Noxubee National Wildlife Refuge in 1974, identifying a 1,200-acre area as suitable for wilderness designation. The wilderness proposal was transmitted to Congress on December 4, 1974. However, Congress has yet to act on the wilderness proposal. The refuge revised the wilderness proposal in 1999 and 2000, and excluded 110 acres separated from the main portion of the proposed wilderness by a levee and the Noxubee River; this area also had been impacted by past timber harvesting. This revision to the proposed wilderness boundary was originally recommended by the refuge manager in March 1975.

The refuge's proposed wilderness area includes 1,090 acres of seasonally flooded and timbered bottomland hardwoods bound by the Noxubee River on the west and north, and Oktoc Creek on the south. The forest in the area has not been harvested since the 1930s, several years before the refuge was established. As such, the area is likely the best representation of an old growth bottomland hardwood forest to be found in east-central Mississippi.

Service policy requires that areas outside Alaska, pending Congressional action, be managed to preserve the wilderness resource. The proposed wilderness at Noxubee refuge is managed under guidance found in the Refuge Manual under 6 RM 8, Wilderness Area Management. The Service is proposing to revise this policy; the Draft Wilderness Stewardship Policy was published in the Federal Register on January 16, 2000. The draft policy provides additional guidance on management of wilderness and proposed

*Noxubee
National Wildlife Refuge*

**Section A.
Final Comprehensive
Conservation Plan**

**CHAPTER II -
Refuge Description**

wilderness. The only management activities conducted in the proposed wilderness are research projects and maintenance of the Wilderness Trail (foot trail). Research projects are basically limited to collections and surveys which have no impact on the area's wilderness character. The Wilderness Trail forms a loop of approximately 4 miles through the area, with the trailhead located at the end of Keaton Tower Road. The trail is maintained with chainsaws and hand tools. In addition to hiking and wildlife observation, hunting and fishing are allowed in the area.

Forest Management

Of the 45,186 acres of forests on the refuge, 42,867 acres (95 percent) are under long-term management as described in the 1996 Forest Management Plan. A variety of silvicultural techniques is used to manage forest habitats, always with an emphasis on providing habitat for threatened and endangered species, migratory birds, and other resident wildlife. Commercial timber harvesting is utilized, where appropriate, to accomplish silvicultural treatments such as selective thinning, stand regeneration, and disease control.

Figure 5. Forest Types and Acreages at Noxubee National Wildlife Refuge.

Pine	23,619
Pine/Hardwood	2,851
Upland Hardwood	3,263
Bottomland Hardwood	15,308
Cypress	145

Current Management of Desired Age-Class Distribution (Pine Acreage)

Stand Age in Years	Age Class	Total Forest Desired	Total Forest Present
0-10	Regeneration	10%	5%
11-30	Immature	20%	5%
31-80	Mature	50%	84%
80+	Old Growth	20%	6%

Current Management of Desired Age-Class Distribution (Hardwood Acreage)

Stand Age in Years	Age Class	Total Forest Desired	Total Forest Present
0-10	Regeneration	5%	3%
11-30	Immature	10%	7%
31-120	Mature	65%	90%
120+	Old Growth	20%	0%

Section A.
Final Comprehensive
Conservation Plan

CHAPTER II -
Refuge Description



Mallard ducks in flooded timbers
USFWS Photo

Selective thinning consists of removing selected trees for the purpose of enhancing the health and vigor of remaining trees. This technique is especially important in maintaining healthy stands of pines that are resistant to attack by southern pine beetles. The technique is also occasionally used in hardwood stands where mast-bearing trees need to be released from competition with other species that are less valuable to wildlife.

Stand regeneration consists of removing most or all of the over-story trees to facilitate the regeneration of young trees. This technique is used to achieve a more even distribution of age classes within the refuge's forest stands and to provide early successional habitat needed by several wildlife species, especially certain groups of neotropical migratory birds. Regeneration is done in such a way that it mimics natural regeneration processes such as wind throw and southern pine beetle outbreaks.

Prescribed fire is also used to treat approximately 6,000 acres of forest habitat each year. The majority of this burning is done in pine habitats, and to a lesser extent in pine/hardwood habitats. Prescribed fire is a valuable tool that primarily retards succession in the mid- and lower-story vegetation as it eliminates shrubs and small trees, allowing grasses and herbaceous plants to grow instead. This sort of habitat improvement is absolutely essential to maintaining habitat for red-cockaded woodpeckers, Bachman's sparrow, bobwhite quail, and several other wildlife species. Additional benefits of prescribed fire include reducing the risk and catastrophic effect of wildfire, as well as functioning to recycle nutrients locked up in woody vegetation.

Fields

Refuge fields are managed to produce a variety of vegetation types. Many fields are planted with grain crops such as sorghum, wheat, or lespedeza to provide food for wildlife species such as waterfowl and quail. Other fields are left fallow to provide a more natural plant community of native forbs and grasses, many of which have value as food or cover for wildlife. Still other fields are maintained in perennial grasses, such as bermuda, dallis, and fescue. Prescribed fire and mowing are the primary tools used to maintain field habitats.

Water Impoundments

Bluff and Loakfoma lakes are man-made and have water control structures that allow the refuge to actively manage water levels. The shallow backwater portions of these lakes provide extensive moist-soil habitat. By discing and mowing these areas during summer draw downs, the refuge is able to encourage moist-soil plants such as wild millet, smartweed, and sedges that are very important waterfowl foods. These draw-down events also provide important feeding opportunities for wood storks, as fish and other small animals are concentrated in small pools.

To attract waterfowl, four greentree reservoirs were constructed and are now managed to permit winter flooding of certain bottom-land areas. This allows active management of water levels in these areas that mimics the natural flooding regime caused by winter rains. These areas provide essential habitat to migratory waterfowl, especially mallards and wood ducks, as well as a variety of wading birds.

Ross Branch Reservoir is used to store water to flood the Prisock Moist-Soil Management Area. This area consists of 220 acres subdivided into 12 small impoundments that are managed intensively for waterfowl. Management practices are designed to produce high quality waterfowl foods through the planting of crops such as sorghum, rice, or millet, or by managing native moist-soil plants.

Invasive Species/Pests

Infestations of southern pine beetle, kudzu, cogon grass, and American lotus require on-going eradication efforts. Integrated invasive plant management and a combination of technologies are utilized which may include biological, mechanical, or chemical applications to control or eradicate certain species.

Other Management

Other activities administered by the refuge include routine maintenance, law enforcement, management of utility and conservation easements, wildlife propagation and stocking, scientific collections, marking and banding, disease prevention and control, maintenance of facilities, and acquiring key properties from willing sellers. The refuge staff also provides technical assistance to private landowners who implement conservation practices.

Physical Resources

Soils and Topography

The refuge lies within the coastal plain physical division; however, it extends over three separate soil association regions: interior flatwoods, which typically are poorly drained clays; upper coastal plain with soils that are more sandy clays, usually well drained due to topography; and black belt prairie with soils that are calcareous based clays and loams with moderate drainage (Miller 1967). The majority of the refuge is in the interior flatwoods region which is relatively flat with elevations rarely varying more than 20 feet throughout the area. The extreme west and southwest portion of the refuge (Bevills Hill area) lies in the upper coastal plain region. This region is best described as hilly, and has the greatest variation in elevations found on the refuge. Here, elevations can vary as much as 100 feet over a distance of several hundred feet. A small portion of the southeast corner of the refuge (Morgan Hill area) is in the black belt prairie region, and has topography that is intermediate between the two previous regions. The area is flat to gently rolling with elevations varying as much as 100 feet, but over a longer distance, such as several thousand feet. Overall refuge elevations range from 200 to 560 feet Mean Sea Level.

The prominent soil associations found on Noxubee refuge are: Stough-Freest-Vimville; Falkner-Longview-Savannah; Longview-Falkner-Prentiss; Mathiston-Urbo; Maben-Ruston-Savannah; Stough-Prentiss-Myatt; Sweatman-Boswell; Wilcox-Falkner; Kipling-Savannah-Oktibbeha; and Wilcox.

Hydrology

The waters of the refuge drain through the Noxubee River towards the southeast, into the Tennessee-Tombigbee Waterway, which in turn drains into the Mobile River and eventually into the Gulf of Mexico. Refuge waters include more than 55 miles of streams and creeks, 20 miles of the Noxubee River, and 1,900 acres of lakes (primarily Bluff and Loakfoma). Water movement is slow in low-lying areas.

Climate

The refuge has long, hot summers because moist tropical air from the Gulf of Mexico persistently covers the area. Winters are cool and fairly short with only a rare cold wave that usually moderates in a few days. Precipitation is fairly heavy throughout the year, with prolonged droughts being rare. In winter, the average temperature is 45 degrees Fahrenheit, and the average daily minimum temperature is 34 degrees. In summer, the average daily temperature is 80 degrees, and the average daily maximum temperature is 91 degrees. Temperatures regularly fall below freezing in the winter, and rise above 90 degrees in the summer, with occasional heat waves pushing mid-day temperatures into the 100s.

The normal rainy season occurs from December to May, with an average annual precipitation of about 56 inches. Thunderstorms occur regularly throughout the summer. The average seasonal snowfall is 1 inch. During an average year, measurable snowfall takes place during December through March. The average relative humidity in mid-afternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The prevailing wind is from the south. Wind speed is highest in spring averaging 8 miles per hour. Severe local storms, including tornadoes, occasionally strike in the area. Storms are short in duration and can cause damage in localized areas. Every few years, in summer or autumn, a tropical depression or remnant of a hurricane that has moved inland from the Gulf of Mexico causes extremely heavy rains, lasting 2 or 3 days.

Social and Economic Environment

The refuge consists of 47,049 acres within a 56,451-acre approved acquisition boundary, with 8,556 acres in private ownership (inholdings within the approved acquisition boundary). Its northern boundary is about 5 miles south-southwest of Starkville, Mississippi, and about 12 miles west of Brooksville, Mississippi. The largest municipality and population center in the area is Columbus, Mississippi, about 35 miles to the northeast, in Lowndes County.

The region encompassing the refuge, often referred to as the Golden Triangle, is supported by an agricultural and timber economy. Much

*Noxubee
National Wildlife Refuge*

**Section A.
Final Comprehensive
Conservation Plan**

**CHAPTER II -
Refuge Description**

of the area is forested, and the forest products industry is vital to the region's local economy. Forestry is second only to farming as the largest industry in Mississippi. Manufacture of wood products also forms the second largest manufacturing sector in Mississippi. Most of the forest industry is based on privately owned forest land, which tends to be in smaller scattered parcels. Concurrently, the number of working farms is declining and the size of larger corporate farms is increasing regionally. While agricultural and timber products have always been a large component of the economy, beginning in the 1950s and continuing until the national recession in the 1980s, manufacturing became the primary source of employment and income for the area's population. Growth in this sector slowed somewhat during the late 1990s. Currently, value-added manufacturing is seen as the most promising field for economic development in the region.

The total population of the three counties in which the refuge is located is about 70,400 people, or only about 3 percent of the state's population, and grows at about 2.4 percent every 5 years. The people in these counties typically are native to the state, have a per capita income of about \$8,000 (about 82 percent of the state rate), with only about 64.2 percent of persons over 25 having high school diplomas (nearly identical to the 64.3 percent state rate). In the area, approximately 17 percent of households rely on some sort of public assistance income (compared to 15 percent of the state's households). Occupations vary with the locale; the larger municipal areas (Starkville and Columbus) have a comparatively high percentage of professional, managerial, and administrative support occupations, whereas the smaller towns and rural areas tend to have a higher proportion of employed persons working as operators, handlers, laborers, and assemblers. Unemployment rates in the population centers tend to remain below the national average, at about 3 percent annually (vs. 5 percent). The unemployment rates are substantially higher in the surrounding rural areas, fluctuating from around 7 to almost 10 percent.

The above statistics were compiled from the 1990 Census of Housing and Population, the Starkville Visitors and Convention Council, and the Golden Triangle Planning and Development District, Inc.

Land Uses

The management of public lands is essential for sustaining and enhancing wildlife habitat used and enjoyed by growing numbers of people in Mississippi. There are 13 national wildlife refuges, 2 national forests, and 3 national parks within the state. There are 3 wilderness areas in Mississippi, 2 are managed by Desoto National Forest and the other is managed by the National Park Service at Gulf Islands Seashore.

The Mississippi Department of Wildlife, Fisheries, and Parks manages approximately 38 wildlife management areas, 21 fishing lakes, 28 state parks, and brackish and saltwater fishing areas along the coast totaling some 800,000 acres. The Department coordinates the state wildlife conservation program and provides public recreation opportunities including an extensive hunting and fishing program.

*Noxubee
National Wildlife Refuge*

**Section A.
Final Comprehensive
Conservation Plan**

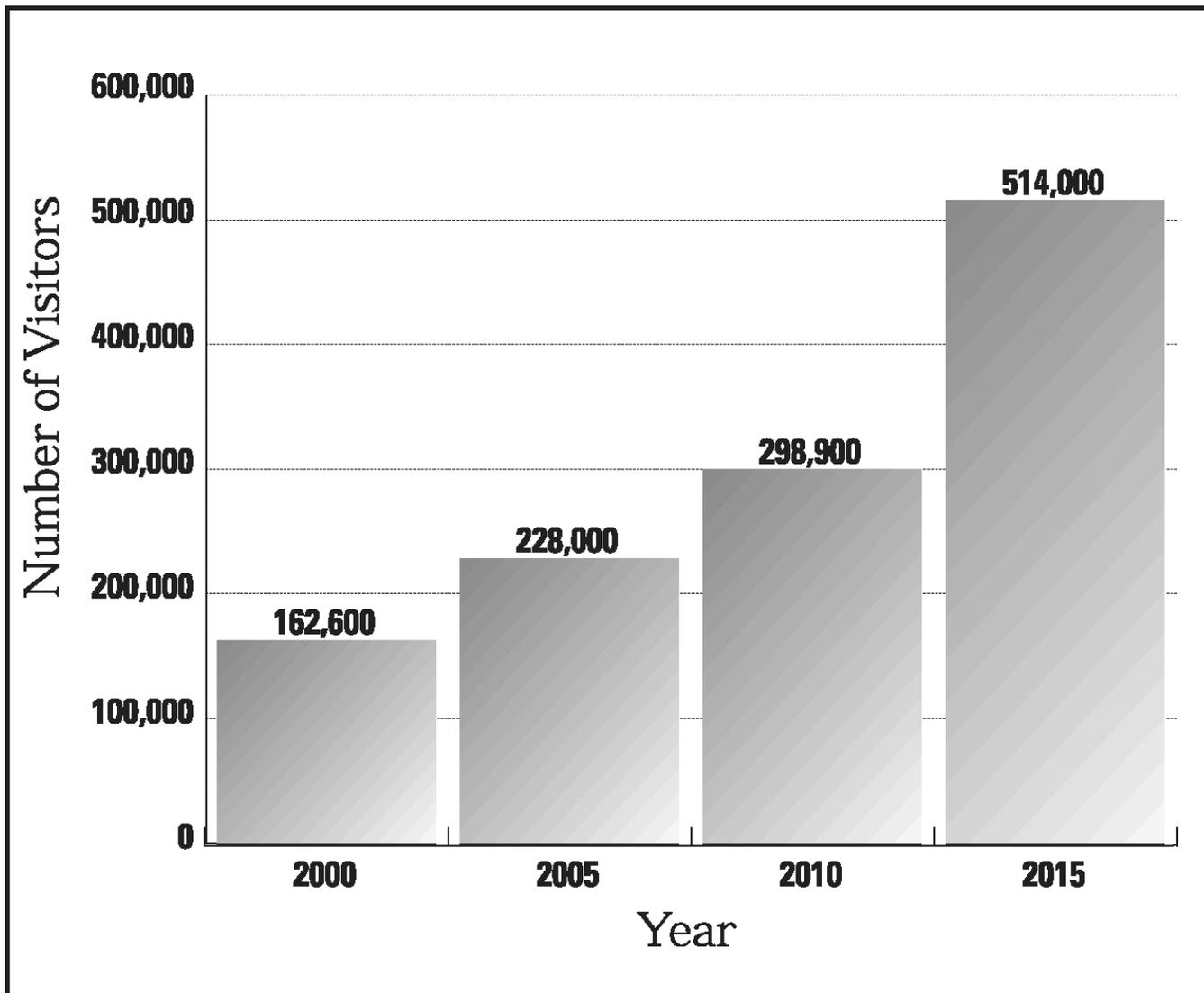
**CHAPTER II -
Refuge Description**

The closest wildlife management areas to the refuge include the 5,333-acre Black Prairie, 8,244-acre John W. Starr, and the 24,314-acre Choctaw—all within an hour's drive of the refuge. The nearest sport fishing lake is Oktibbeha County Lake and the nearest parks are Lake Lowndes and Legion State.

Education and Visitor Services

The refuge plays an important role in the economy of local communities and the region. With annual visitation approaching 200,000, the refuge is obviously an important destination for people seeking recreational and educational opportunities, attracting local residents as well as tourists (Fig. 7). Approximately one-third of these visitors is participating in consumptive use activities such as hunting and fishing, while the other two-thirds are involved in non-consumptive recreation (e.g., birdwatching, sightseeing, hiking, picnicking, etc.) or education. Most, if not all, utilize services provided by local vendors, thus infusing money into the local economy.

Figure 7. Projected Public Use at Noxubee National Wildlife Refuge.



(Projection generated by Starkville Convention and Visitors Bureau based on anticipated regional growth.)

Section A.

**Final Comprehensive
Conservation Plan**

**CHAPTER II -
Refuge Description**

The Noxubee Conservation Center is a major attraction of the refuge, and utilized by the Starkville School District. The 7,000-square-foot facility was opened to the public in 2000, and is capable of serving up to 18,000 students per year.

Forest Revenues

The forest management program also has a very direct impact on the local economy. To accomplish needed habitat management, the refuge will typically thin from 200 to 600 forested acres per year, roughly half of which is in pine forests and half in hardwood forests. Likewise, approximately 100 to 200 acres are harvested per year to regenerate new stands of trees, primarily in pine forests. Sometimes additional timber harvests, averaging 50 to 100 acres per year, occur to salvage trees that are 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. These timber harvests not only provide raw material for both regional saw and pulp mills, but also provide employment for local loggers, foresters, and others.

Cooperative Farming

Cooperative farming is the term used for cropping activities done by a third party on land that is owned by the Service in fee title, or controlled by the Service through a restrictive easement. This type of activity is usually done on a short-term basis (3 years or less) to prepare an optimum seed bed for migratory bird species and native grassland species.

The cropping is done under the terms and conditions of a Cooperative Farming Agreement or Special Use Permit issued by the refuge manager. The terms of the agreement or permit ensure that all current restrictions are followed. Cooperative farming activities are only compatible on previously disturbed areas that have acceptable levels of chemical residue, noxious weeds or non-native plant species or ecotypes, or to honor the land use clauses of a purchase agreement. To ensure that all Service policies are met, all such land use clauses must be approved prior to Service acceptance of the purchase agreement.

Previously, the cooperative farming program at the refuge emphasized the production of soybeans and corn. In recent years, these management activities have been phased out with only two cooperative farmers remaining both harvesting hay from refuge fields. The decrease is primarily the result of changes in the price of commodities. In particular, the price of soybeans and corn decreased while the price of pine pulpwood and sawtimber increased, causing most local farmers to stop farming, placing acreage, instead, in pine plantations.

Refuge Operating Base Funds

The refuge's need for goods and services also plays a small but no less direct role in local economies, as local businesses provide many of these. The refuge received \$983,000 in FY 2002, in the form of

**Section A.
Final Comprehensive
Conservation Plan**

**CHAPTER II -
Refuge Description**

base operating funds and special programs (such as fire management, expenses for timber sales, etc.), that are typically funded each year. Nearly all of this money goes into the local economy either as the salaries of refuge employees or payments to vendors and contractors for supplies and services.

In addition, improvements made to the refuge also benefit local economies and communities. Recent examples are the paving of 6 miles of county roads which are the primary entrances to the refuge. This was accomplished with refuge funds through an agreement allowing joint maintenance of county-owned roads. Other examples are the Noxubee Conservation Center, built to facilitate environmental education for local students, and the new Refuge Office/Visitor Center to be completed by 2003. Both of these facilities are/will be responsible for attracting many people to the area, thereby infusing money into local economies.

The Noxubee Conservation Center provides environmental education programs to approximately 8,000 students per year (primarily K-12). Likewise, a formal Memorandum of Understanding exists allowing faculty from Mississippi State University to utilize the refuge as an outdoor classroom for a variety of classes including natural resources, architecture, and archaeology. Refuge staff provide presentations to numerous school classes and civic clubs each year. The visitor center portion of the new Refuge Office/Visitor Center will provide many educational opportunities for the public.

Land Protection and Conservation

By law, the refuge is exempt from paying property tax, and instead makes revenue sharing payments to three counties in which it is located: Oktibbeha, Noxubee, and Winston. This payment is made through the Refuge Revenue Sharing Act established by Congress. The program provides a method of collecting monetary receipts from revenue generating activities on refuges within the nation, pooling them together, and paying them out to counties containing refuge lands. Payment for acquired land is computed on whichever of the following formulas is greatest: (1) three-fourths of one percent of the fair market value of the lands acquired in fee title; or (2) 25 percent of the net refuge receipts collected; or (3) 75 cents per acre of the lands acquired in fee title within the county. If the receipts generated on refuges do not meet the entitlement amount, Congress may approve additional funds to make up the shortfall. The following is a summary of payments made by Noxubee National Wildlife Refuge over 5 years:

Year	Oktibbeha County	Noxubee County	Winston County
2000	\$149,581	\$107,101	\$167,068
1999	\$170,516	\$122,090	\$190,100
1998	\$183,148	\$131,135	\$203,987
1997	\$194,610	\$139,342	\$216,753
1996	\$ 97,835	\$ 78,749	\$134,610

Cultural Resources

Past archaeological investigations at the refuge have been mostly limited to compliance surveys prior to construction projects and land exchanges. A variety of resources has been discovered ranging from relics of early Native-American settlements to more recent sites where farm houses and other structures were located at the time the refuge was established. The earliest known site was located by Dr. Janet Rafferty, near Oktoc Creek, and it produced artifacts dating to the early Archaic period (ca. 9000-7000 B.C.). Another well-studied site is located on the shore of Bluff Lake and dates back to the Gulf Formational through Miller periods (ca. 1000 B.C.), with artifacts consisting of ceramic shards, projectile points, drill bits, hammerstones, and fire-cracked rocks.

Numerous other Native-American sites occur throughout the refuge, where projectile points and pottery shards are commonly found. However, none of these sites has been studied in detail. Although the Choctaw tribe is now the most prominent tribe in this part of Mississippi, the Choctaw culture did not form until after European contact, as remnants of other tribes, decimated by introduced diseases, came together to form a new political and ethnic body. All of the sites described above pre-date the Choctaw culture, and so far no sites have been discovered on the refuge which can definitely be assigned to the Choctaws.

Evidence of Euro-American settlements is also abundant on the refuge. The oldest documented Euro-American site was located in 1997, during an archaeological survey conducted in preparation for the widening of State Highway 25. Named the Colclough Farmstead Site, and dating back to the 1800s and early 1900s, it is considered representative of a middle class slaveholding farmer. Features of the site included a smokehouse, root cellar, piers or posts of a house and several outbuildings, the remains of an animal pen, a bottle dump, and tire ruts. Artifacts recovered included cut and wire nails, handmade brick fragments, window glass, amethyst glass, white-ware, pearlware, salt- and alkaline-glazed stoneware shards, and bones of white-tailed deer and domestic pigs.

Other notable cultural resources located on or near the refuge include the Old Robinson Road, built in 1821, by Raymond Robinson, to serve as a major route between Columbus and Jackson, Mississippi. A portion of the road is located on the refuge and was listed in the National Register of Historic Places in 1975. Numerous other Euro-American sites are found on the refuge, including eleven cemeteries, six churches, four schools, four mill sites (sawmills and gristmills), and one diversion canal.

The refuge is currently collecting information from some of the older refuge employees on a variety of historic sites such as farms, agricultural outbuildings, cattle dips, and cemeteries. Future plans include limited testing at several historic sites to determine site limits, dates of occupation, function, and integrity of archaeological deposits.

Ecological Threats and Problems

The loss of large, forested tracts (at least 20,000 acres) of old pine and mixed stands of pine and hardwood has led to the decline of area sensitive species, such as the red-cockaded woodpecker. Fire suppression in pine stands has exacerbated the problem. Flood control on the Tennessee-Tombigbee Waterway and the Noxubee River has led to a decline of fish and other aquatic populations, including paddlefish and six species of mussels. Management of invasive species is difficult without sufficient staff and equipment. The lack of funding for investigations and evaluations of biological programs pertaining to avifauna, mollusks, herbivores, invertebrates, plants, and cultural

Management Area	Management Issue or Problem
Forests	Loss of large stands of old growth and mature forests; Changes in habitat composition and species diversity due to fire suppression; Management of red-cockaded woodpecker may come at the expense of other species; Suppression of natural fire in and around developed urban areas; Increase in exotic and noxious plant and animal species; Construction of access roads for forest management activities;
Lakes, Streams, Wetlands	Water pollution and sewage discharge generated from development upstream from refuge habitats to the north and east; Loss of riverine habitat and degraded water quality from off-refuge discharge; Increased demands on local water supplies; Manipulation of water levels in lakes for waterfowl management at the expense of fisheries resources; Development and management of flood control systems; Increases in exotic and noxious plant and animal species; Use of insecticides and herbicides;
Grassland/Prairie Vegetation	Conversion of native grasslands to improved pasture/agriculture; Lack of funding to support long-term maintenance of prairie restoration site;
Public Use	Increase in overall public use without adequate staff and facilities to accommodate the increase; Pressure to provide more hunting opportunities;
General Administration	Maintenance of numerous entry points and access roads; Lack of staff to conduct baseline biological surveys and monitoring;

resources is an ongoing problem. The present staff and budget are not sufficient to manage the increasing demand for recreation and environmental education activities. Overall, the refuge is faced with a tremendous challenge of managing for the cumulative habitat effects of land and water resource development activities. The primary ecological threats and problems associated with the refuge are listed on the previous page.

Land management activities to the north and east of the refuge pose a serious threat to wildlife resources on the refuge. These land management activities include commercial, residential, and industrial development. Private lands bordering the refuge to the north and east are close to the growing communities of Starkville and Longview, and busy travel routes—Highways 12 and 25. This development threatens wildlife resources in a variety of ways, primarily through direct loss of habitat, but also indirectly through water pollution generated from runoff and sewage discharges.

A large industrial hog farm is located east of the refuge and there is a considerable threat of other industrial farming operations (i.e., chicken houses, catfish ponds) locating nearby. Private parcels bordering refuge lands are becoming increasingly fragmented through home building.

Conservation Priorities

Priorities identified for Noxubee National Wildlife Refuge in the Central Gulf Ecosystem Five-Year Action Plan include a strong emphasis on managing for the red-cockaded woodpecker and continued emphasis on managing to support the overall health of the ecosystem. Specific priorities include:

- Restore and protect key habitats and manage populations for migratory birds;
- Restore and protect pine habitats and their associated plant and animal communities including red-cockaded woodpeckers;
- Collect breeding bird census information;
- Complete additional phases of environmental education center in cooperation with local schools;
- Develop a refuge friends group (nonprofit);
- Develop projects in partnership with federal, state, and local agencies, and non-governmental organizations that focus on long-term public education opportunities.

Noxubee
National Wildlife Refuge

Section A.
Final Comprehensive
Conservation Plan

CHAPTER II -
Refuge Description