SWANQUARTER NATIONAL WILDLIFE REFUGE

DRAFT COMPREHENSIVE CONSERVATION PLAN AND ENVIRONMENTAL ASSESSMENT

Hyde County, North Carolina

U.S. Department of the Interior
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SECTION A. DRAFT COMPREHENSIVE CONSERVATION PLAN

I. Background

INTRODUCTION

This Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Swanquarter National Wildlife Refuge (Swanquarter NWR) was prepared to guide management actions and direction for the refuge. Fish and wildlife conservation will receive first priority in refuge management; wildlife-dependent recreation will be allowed and encouraged as long as it is compatible with, and does not detract from, the mission of the refuge or the purposes for which it was established.

A planning team developed a range of alternatives that best met the goals and objectives of the refuge and that could be implemented within the 15-year planning period. This Draft CCP/EA describes the Fish and Wildlife Service's proposed plan, as well as other alternatives considered and their effects on the environment. The Draft CCP/EA will be made available to state and federal government agencies, conservation partners, and the general public for review and comment. Comments from each entity will be considered in the development of the final CCP.

PURPOSE AND NEED FOR THE PLAN

The purpose of the Draft CCP/EA is to develop a proposed action that best achieves the refuge purpose; attains the vision and goals developed for the refuge; contributes to the National Wildlife Refuge System mission; addresses key problems, issues, and relevant mandates; and is consistent with sound principles of fish and wildlife management.

Specifically, the plan is needed to:

- Provide a clear statement of refuge management direction;
- Provide refuge neighbors, visitors, and government officials with an understanding of Service management actions on and around the refuge;
- Ensure that Service management actions, including land protection and recreation/education programs, are consistent with the mandates of the National Wildlife Refuge System; and
- Provide a basis for the development of budget requests for operations, maintenance, and capital improvement needs.

FISH AND WILDLIFE SERVICE

The Fish and Wildlife Service (Service) traces its roots to 1871 and the establishment of the Commission of Fisheries involved with research and fish culture. The once independent commission was renamed the Bureau of Fisheries and placed under the Department of Commerce and Labor in 1903.

The Service also traces its roots to 1886 and the establishment of a Division of Economic Ornithology and Mammalogy in the Department of Agriculture. Research on the relationship of birds and animals to agriculture shifted to delineation of the range of plants and animals, so the name was changed to the Division of the Biological Survey in 1896.

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

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

As part of its mission, the Service manages more than 540 national wildlife refuges, covering over 95 million acres. These areas comprise the National Wildlife Refuge System, the world's largest collection of lands set aside specifically for fish and wildlife. The majority of these lands, 77 million acres, are in Alaska. The remaining acres are spread across the other 49 states and several United States territories. In addition to refuges, the Service manages thousands of small wetlands, national fish hatcheries, 64 fishery resource offices, and 78 ecological services field stations. The Service enforces federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies.

NATIONAL WILDLIFE REFUGE SYSTEM

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

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

The Improvement Act established, for the first time, a clear legislative mission of wildlife conservation for the National Wildlife Refuge System. Actions were initiated in 1997 to comply with the direction of this new legislation, including an effort to complete CCPs for all refuges. These CCPs, which are completed with full public involvement, help guide the future management of refuges by establishing natural resources and recreation/education programs. Consistent with the Improvement Act, approved CCPs will serve as the guidelines for refuge management for the next 15 years. The Improvement Act states that each refuge shall be managed to:

- Fulfill the mission of the National Wildlife Refuge System;
- Fulfill the individual purposes of each refuge;
- Consider the needs of wildlife first;
- Fulfill requirements of comprehensive conservation plans that are prepared for each unit of the refuge system;
- Maintain the biological integrity, diversity, and environmental health of the refuge system; and
- Recognize that wildlife-dependent recreation activities, including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation, are legitimate and priority public uses; and allow refuge managers authority to determine compatible public uses.

The following are just a few examples of your national network of conservation lands. Pelican Island National Wildlife Refuge, the first refuge, was established in 1903 for the protection of colonial nesting birds in Florida, such as the snowy egret and the brown pelican. Western refuges were established for American bison (1906), elk (1912), prong-horned antelope (1931), and desert bighorn sheep (1936) after over-hunting, competition with cattle, and natural disasters decimated once-abundant herds. The drought conditions of the 1930s Dust Bowl severely depleted breeding populations of ducks and geese. Refuges established during the Great Depression focused on waterfowl production areas (i.e., protection of prairie wetlands in America's heartland). The emphasis on waterfowl continues today but also includes protection of wintering habitat in response to a dramatic loss of bottomland hardwoods. By 1973, the Service had begun to focus on establishing refuges for endangered species.

Approximately 38 million people visited national wildlife refuges in 2002, most to observe wildlife in their natural habitats. As the number of visitors grows, there are significant economic benefits to local communities. In 2001, 82 million people, 16 years and older, fished, hunted, or observed wildlife, generating $108 billion. In a study completed in 2002 on 15 refuges, visitation had grown 36 percent in seven years. At the same time, the number of jobs generated in surrounding communities grew to 120 per refuge, up from 87 jobs in 1995, pouring more than $2.2 million into local economies. The 15 refuges in the study were Chincoteague (Virginia); National Elk (Wyoming); Crab Orchard (Illinois); Eufaula (Alabama); Charles M. Russell (Montana); Umatilla (Oregon); Quivira (Kansas); Mattamuskeet (North Carolina); Upper Souris (North Dakota); San Francisco Bay (California); Laguna Atacosa (Texas); Horicon (Wisconsin); Las Vegas (Nevada); Tule Lake (California); and Tensas River (Louisiana), which are the same refuges identified for the 1995 study. Other findings also validate the belief that communities near refuges benefit economically. Expenditures on food, lodging, and transportation grew to $6.8 million per refuge, up 31 percent from $5.2 million in 1995. For each dollar spent on the Refuge System, surrounding communities benefited with $4.43 in recreation expenditures and $1.42 in job-related income (Caudill and Laughland, unpubl. data).

Volunteers continue to be a major contributor to the success of the Refuge System. In 2002, volunteers contributed more than 1.5 million hours on refuges nationwide, a service valued at more than $22 million.

The wildlife and habitat vision for national wildlife refuges stresses that wildlife comes first; that ecosystems, biodiversity, and wilderness are vital concepts in refuge management; that refuges must be healthy and growth must be strategic; and that the Refuge System serves as a model for habitat management with broad participation from others.

The Improvement Act stipulates that CCPs be prepared in consultation with adjoining federal, state, and private landowners and that the Service develop and implement a process to ensure an opportunity for active public involvement in the preparation and revision (every 15 years) of the CCPs.

All lands of the Refuge System will be managed in accordance with an approved CCP that will guide management decisions and set forth strategies for achieving refuge unit purposes. The CCP will be consistent with sound resource management principles, practices, and legal mandates, including Service compatibility standards and other Service policies, guidelines, and planning documents (602 FW 1.1).

LEGAL AND POLICY CONTEXT

Legal Mandates, Administrative and Policy Guidelines, and Other Special Considerations

Administration of national wildlife refuges is guided by the mission and goals of the National Wildlife Refuge System, congressional legislation, presidential executive orders, and international treaties. Policies for management options of refuges are further refined by administrative guidelines established by the Secretary of the Interior and by policy guidelines established by the Director of the Fish and Wildlife Service. Select legal summaries of treaties and laws relevant to administration of the National Wildlife Refuge System and management of the Swanquarter National Wildlife Refuge are provided in Appendix C.

Treaties, laws, administrative guidelines, and policy guidelines assist the refuge manager in making decisions pertaining to soil, water, air, flora, fauna, and other natural resources; historical and cultural resources; research and recreation on refuge lands; and provide a framework for cooperation between Swanquarter NWR and other partners, such as the North Carolina Wildlife Resources Commission (NCWRC), and private landowners, etc.

Lands within the National Wildlife Refuge System are closed to public use unless specifically and legally opened. No refuge use may be allowed unless it is determined to be compatible. A compatible use is a use that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge. All programs and uses must be evaluated based on mandates set forth in the Improvement Act. Those mandates are to:

- Contribute to ecosystem goals, as well as refuge purposes and goals;
- Conserve, manage, and restore fish, wildlife, and plant resources and their habitats;
- Monitor the trends of fish, wildlife, and plants;
- Manage and ensure appropriate visitor uses as those uses that benefit the conservation of fish and wildlife resources and contribute to the enjoyment of the public; and
- Ensure that visitor activities are compatible with refuge purposes.

The Improvement Act further identifies six priority wildlife-dependent recreational uses. These uses are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. As priority public uses of the Refuge System they receive priority consideration over other public uses in planning and management.

Biological Integrity, Diversity, and Environmental Health Policy

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

NATIONAL AND INTERNATIONAL CONSERVATION PLANS AND INITIATIVES

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

This Draft CCP/EA supports, among others, the Partners-in-Flight Plan, the North American Waterfowl Management Plan, the Western Hemisphere Shorebird Reserve Network, and the National Wetlands Priority Conservation Plan.

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

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

Partners-in-Flight Bird Conservation Plan. Managed as part of the Partners-in-Flight Plan, the South Atlantic Coastal Plain physiographic area represents a scientifically based land bird conservation planning effort that ensures long-term maintenance of healthy populations of native land birds, primarily non-game land birds. Non-game land birds have been vastly under-represented in conservation efforts, and many are exhibiting significant declines. This plan is voluntary and non-regulatory, and focuses on relatively common species in areas where conservation actions can be most effective, rather than the frequent local emphasis on rare and peripheral populations.

U.S. Shorebird Conservation Plan. The U.S. Shorebird Conservation Plan is a partnership effort throughout the United States to ensure that stable and self-sustaining populations of shorebird species are restored and protected. The plan was developed by a wide range of agencies, organizations, and shorebird experts for separate regions of the country, and identifies conservation goals, critical habitat conservation needs, key research needs, and proposed education and outreach programs to increase awareness of shorebirds and the threats they face.

Northern American Waterbird Conservation Plan. This plan provides a framework for the conservation and management of 210 species of waterbirds in 29 nations. Threats to waterbird populations include destruction of inland and coastal wetlands, introduced predators and invasive

species, pollutants, mortality from fisheries and industries, disturbance, and conflicts arising from abundant species. Particularly important habitats of the southeast region include pelagic areas, marshes, forested wetlands, and barrier and sea island complexes. Fifteen species of waterbirds are federally listed, including breeding populations of wood storks, Mississippi sandhill cranes, whooping cranes, interior least terns, and Gulf Coast populations of brown pelicans. A key objective of this plan is the standardization of data collection efforts to better recommend effective conservation measures.

RELATIONSHIP TO STATE WILDLIFE AGENCY

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

The North Carolina Wildlife Resources Commission (NCWRC) provides 1.8 million acres of public hunting, fishing, and trapping through the Game Lands Program. The NCWRC manages the state's freshwater fisheries through research, fisheries management, operation of six fish hatcheries, and habitat conservation to protect the resources and provide diverse fishing experiences. It also manages and monitors the health and status of the state's wildlife populations in a manner which will assure a diverse wildlife resource for future generations of North Carolinians. The NCWRC administers educational programs designed to facilitate conservation of the state's wildlife and other interrelated natural resources and the environment people share with them. It has the responsibility for administrating the sale of hunting and fishing licenses and the registration and titling of vessels to the public. The NCWRC is also charged with enforcing state rules and regulations and maintaining over 1200 buoys and navigational aids statewide.

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

II. Refuge Overview

INTRODUCTION

Swanquarter NWR is located on the Pamlico Sound in Hyde County, North Carolina (Figure 1). The refuge is located at the southern end of a broad, flat and swampy peninsula in northeastern North Carolina, and is surrounded by brackish marsh and cropland. The Service named the refuge for the nearby village of Swan Quarter, the county seat of Hyde County. The village of Swan Quarter (population of 275 in the year 2000) is located at the northern boundary of the refuge, and the village of Engelhard (population of 1,561 in the year 2000) is fifteen miles east of the eastern boundary of the refuge. The major metropolitan area of Raleigh – Durham – Chapel Hill, North Carolina (population of 1,038,703 in the year 2000) is 180 miles west of the refuge, and Norfolk – Virginia Beach – Hampton Roads, Virginia (population of 1,569,541 in the year 2000) is 150 miles north of the refuge. The Pamlico Sound borders the southern boundary of the refuge. This region is part of the physiographic area known as the South Atlantic Coastal Plain and the Fish and Wildlife Service's administrative ecosystem known as the Roanoke-Tar-Neuse-Cape Fear Ecosystem.

REFUGE HISTORY AND PURPOSES

The refuge was established by presidential order on June 23, 1932, under the authority of the Migratory Bird Conservation Act, which prescribes the following purpose to the refuge:

". . . for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. Sec. 715d (Migratory Bird Conservation Act of 1929).

The Fish and Wildlife Act of 1956 prescribed the following purpose to the refuge:

". . .for the development, advancement, management, conservation, and protection of fish and wildlife resources . . . 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. Sec. 742f (b)(1) (Fish and Wildlife Act of 1956).

In addition, because a portion of the refuge (54 percent) was designated a Wilderness Area on October 19, 1976, the purposes of the Wilderness Act of 1964 are supplemental purposes of the refuge:

"Wilderness areas . . . shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness. . . . " 16 U.S.C. 1 1 21.

Logging and land clearing activities over the last 300 years have greatly altered the refuge area's landscape. All of the Swanquarter NWR lands and a 27,082-acre portion of the Pamlico Sound adjacent to the refuge were closed to hunting, taking, or molesting of game birds by Executive Order 2129 on July 18, 1935. The executive order was amended on September 5, 1977 to allow hunting on specific tracts of the refuge. The Service approved an acquisition boundary of 16,411.09 acres and has acquired this land over seven decades (Table 1).

Figure 1. Location of Swanquarter NWR in Hyde County, North Carolina

Table 1. Acquisition history of the Swanquarter NWR

DATE	TRACTS	ACRES	COST	COST PER ACRE	TOTAL ACREAGE	CUMULATIVE COST
1932	2	11,830.19	$47,320.84	$4.00	11,830.19	$47,320.84
1933	2	3,519.15	$13,074.41	$3.71	15,350.34	$60,394.25
1935	1	151.42	$605.68	$4.00	15,501.76	$61,000.93
1980	1	142.33	$0.00	$0.00	15,644.09	$61,000.93
1992	1	768,00	$0.00	$0.00	16,411.09	$61,000.93
Total		**16,411.09**	**$61,000.93**			

SPECIAL DESIGNATIONS

Approximately 8,800 acres of the refuge have been designated a Wilderness Area under the National Wilderness Preservation System (Figure 2). Most of the Wilderness Area is brackish marsh.

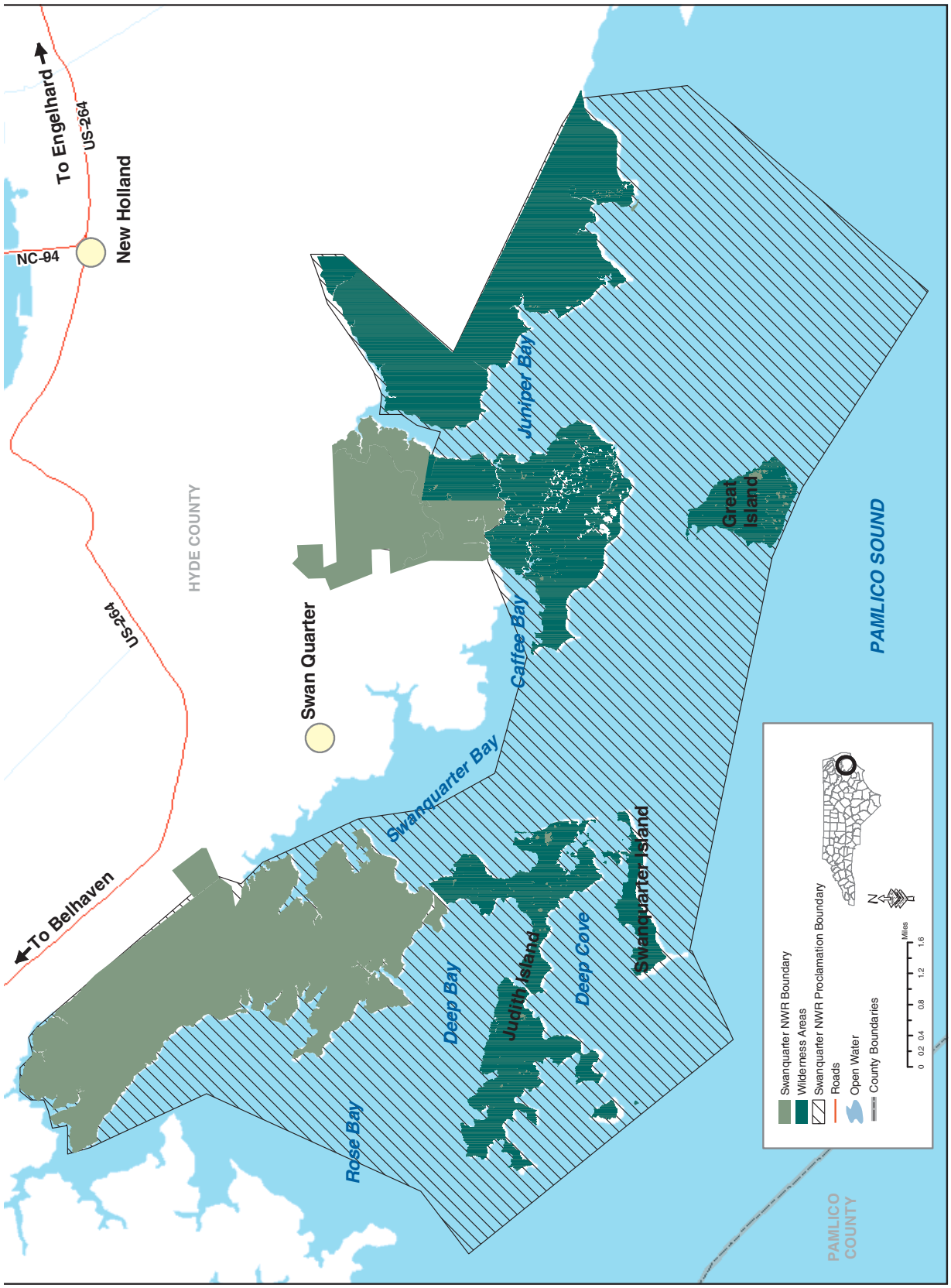
The North Carolina Natural Heritage Program has designated most of the refuge, with the exception of the roads, as a Significant Natural Heritage Area. The Nature Conservancy ranks certain vegetative communities as imperiled or rare (Table 2).

The North Carolina Division of Water Quality has designated several water bodies in the vicinity of Swanquarter NWR as outstanding resource waters or high quality waters. (See Table 5 in the Chapter II Physical Resources, Water Quality Section.)

Table 2. The Nature Conservancy ranking of vegetative communities of Swanquarter MWR

Vegetative Community	State Rank	Global Rank
Low Pocosin	S2	G3
Estuarine Fringe Loblolly Pine Forest	S3	G3
Cypress – Gum Swamp	S3	G4
S1 = Critically imperiled in North Carolina because of extreme rarity or otherwise very vulnerable to extirpation in the state.		
S2 = Imperiled in North Carolina because of rarity or otherwise very vulnerable to extirpation in the state.		
S3 = Rare or uncommon in North Carolina.		
G1 = Critically imperiled globally because of extreme rarity or otherwise very vulnerable to extinction throughout its range.		
G2 = Imperiled globally because of rarity or otherwise very vulnerable to extinction throughout its range.		
G3 = Either very rare and local throughout its range, or found locally in a restricted area.		
G4 = Apparently secure globally, although it may be quite rare in parts of its range (especially at the periphery).		

Figure 2. Location of wilderness areas at Swanquarter NWR



ECOSYSTEM CONTEXT

Swanquarter NWR lies within a physiographic area known as the South Atlantic Coastal Plain (Figure 3). The South Atlantic Coastal Plain was once a 25-million-hectare (62-million-acre) complex of forested wetlands and uplands, dunes, and marshes that extended from Florida to North Carolina. Historically, the extent and duration of seasonal flooding along the ecosystem's rivers fluctuated annually, recharging the South Atlantic Coastal Plain's aquatic systems and creating a rich diversity of dynamic habitats that supported a vast array of fish and wildlife resources.

The refuge is one of the ten national wildlife refuges in eastern North Carolina. Those ten national wildlife refuges (Alligator River, Pea Island, Cedar Island, Currituck, Great Dismal Swamp, Mackay Island, Mattamuskeet, Roanoke River, Pocosin Lakes, and Swanquarter) and the Back Bay National Wildlife Refuge in Virginia are all located in the watersheds of the Roanoke, Tar, Neuse, and Cape Fear Rivers, which have collectively been designated as Ecosystem Unit # 34, the Roanoke–Tar–Neuse–Cape Fear Ecosystem, by the Service.

REGIONAL CONSERVATION PLANS AND INITIATIVES

Along with the Service's legal mandates and initiatives, other planning activities directly influence the development of the CCP. Various groups and agencies develop and coordinate planning initiatives involving regional, state, and local agencies; local communities, non-governmental organizations, and private individuals to help restore habitats for fish and wildlife on and off public lands.

The Service is initiating cooperative partnerships in an effort to reduce the declining trend in biological diversity. Biological planning for species groups targeted in this plan reflects the North American Waterfowl Management Plan, which includes the Atlantic Coast Joint Venture, the Joint Venture between NCWRC and the Service, Partners-in-Flight Plan, and the South Atlantic Migratory Bird Initiative (SAMBI).

The Atlantic Coast Joint Venture focus is that of the middle and upper Atlantic coast. Within the Atlantic Coast Joint Venture was the joint venture formed among the NCWRC, the Service, and private conservation organizations. The South Atlantic Coastal Plain serves as a primary migration habitat for migratory songbirds returning from Central and South America. It also provides wintering, breeding, and migrating habitat for mid-continental wood duck and colonial bird populations. Restoration of migratory songbird populations is a high priority of the Partners-in-Flight Plan for the South Atlantic Physiographic Region.

The Partners in Flight Plan emphasizes land bird species as a priority for conservation. Habitat loss, population trends, and the vulnerability of species and habitats to threats are all factors used in the priority ranking of species. Further, biologists from local offices of the Service, the NCWRC, and conservation organizations, such as the Audubon Society and The Nature Conservancy, have identified focal species for each habitat type from which they will determine population and habitat objectives and conservation actions. This list of focal species, objectives, and conservation actions will aid migratory bird management on the refuge.

Figure 3. Swanquarter, Mattamuskeet, and Cedar Island NWRs in the South Atlantic Coastal Plain Ecosystem

The Farm Bill programs, administered by the United States Department of Agriculture, have state level plans and priority ranking systems in which the Service has input. The Service also utilizes these programs to assist private landowners in the vicinity of national wildlife refuges to manage habitat for wildlife or protect their land with easements.

The NCWRC has its own Comprehensive Wildlife Conservation Strategy to help direct the state's allocation of funds from the federally funded State Working Grants Program. The Service has provided input to the development and execution of the strategy. The Service, in conjunction with the North Carolina Division of Coastal Management, will ensure the proposed activities of this CCP are consistent with the State's coastal management program.

ECOLOGICAL THREATS AND PROBLEMS

REGIONAL HABITAT LOSS AND FRAGMENTATION

The South Atlantic Coastal Plain has changed markedly over the last 100 years as civilization spread throughout the area. Scientists have estimated that land conversion has cleared 40 percent of the natural vegetation. The greatest changes to the landscape have been in the form of land clearing for agriculture and urban development (Hunter et al., 2001).

Although these changes have allowed people to settle and earn a living in the area, they have had a tremendous negative effect on biological diversity, biological integrity, and environmental health of the South Atlantic Coastal Plain. The changes have reduced vast areas of forests, pocosins, marshes, and coastal dunes to fragments ranging in size from very small tracts of limited functional value to a few large areas that have maintained many of the original functions and values of forested habitat. Severe fragmentation has resulted in a substantial decline in biological diversity and integrity. Species endemic to the South Atlantic Coastal Plain that are now extinct, endangered, or threatened include the piping plover, sea turtle, red wolf, and red-cockaded woodpecker (Table 3).

Table 3. Federally listed threatened and endangered animal species of the North Carolina Coastal Plain

Status	Common Name	Scientific Name
Endangered	Manatee, West Indian**	*Trichechus manatus*
Endangered	Sea Turtle, Hawksbill**	*Eretmochelys imbricata*
Endangered	Sea Turtle, Kemp's Ridley**	*Lepidochelys kempii*
Endangered	Sea Turtle, Leatherback**	*Dermochelys coriacea*
Endangered	Sturgeon, Shortnose	*Acipenser brevirostrum*
Endangered	Wolf, Red*	*Canis rufus*
Endangered	Woodpecker, Red-cockaded**	*Picoides borealis*
Threatened***	Alligator, American*	*Alligator mississippiensis*
Threatened	Plover, Piping**	*Charadrius melodus*
Threatened	Sea Turtle, Green	*Chelonia mydas*
Threatened	Sea Turtle, Loggerhead**	*Caretta caretta*

** Presence Documented on Swanquarter National Wildlife Refuge*

*** Other Species Listed in Hyde County, North Carolina*

**** Listed by Similarity of Appearance*

Breeding bird surveys show continuing declines in species and species populations. The avian species most adversely affected by fragmentation include those that are area-sensitive (e.g., those dependent on large continuous blocks of hardwood forest); those that depend on forest interiors; those that depend on special habitat requirements (e.g., mature forests or a particular food source); and/or those that depend on good water quality. Habitat loss in general has affected species dependent on coastal marshes, and exposed sandy areas on beaches, sandbars, and within dune ecosystems.

More than 300 species of breeding migratory songbirds inhabit the region. Some of the inland species, including Swainson's warbler, prothonotary warbler, swallow-tailed kites, wood thrush, and cerulean warbler, have declined substantially and need the benefits of large forested blocks to recover and sustain their existence. On the Outer Coastal Plain, songbirds, such as seaside sparrow, saltmarsh sharp-tailed sparrow, and Nelson's sharp-tailed sparrow, depend on declining marsh habitat. The secretive marshbirds black rail and yellow rail require brackish marsh. The threatened piping plovers, red knots, least terns, black skimmers, and American oystercatchers are shorebirds that nest on the decreasing acreage of unvegetated sand along beaches and among coastal dunes.

Fragmentation of bottomland hardwood forests in the interior areas of the coastal plain has left many of the remaining forested tracts surrounded by agricultural lands. Intensive agriculture has removed most of the forested corridors along sloughs that formerly connected the forest patches. The loss of connectivity between the remaining forested tracts hinders the movement of wildlife between tracts and reduces the functional values of many remaining smaller forest tracts. The lost connections also result in a loss of gene flow. Restoring the connections to allow gene flow and reestablish travel corridors is particularly important for some wide-ranging species, such as the black bear.

Habitat loss on the Outer Coastal Plain is more permanent than in the interior. Conversion of marshes for commercial development is irreversible. Conversion of pocosins and nonriverine hardwood forests for agriculture results in the oxidation of the organic soils on which those plant communities evolved.

REGIONAL ALTERATIONS TO HYDROLOGY

In addition to the loss of vast acreages of marshes and bottomland forested wetlands, there have been substantial alterations to the South Atlantic Coastal Plain's hydrology. The changes are the result of construction of flood control and hydroelectric power generation reservoirs/dams, river channel modifications, creation of drainage ditches, installation of flood control levees, deforestation, degradation of aquatic systems due to excessive sedimentation and contamination, and urban development. The natural hydrology of a region is directly responsible for the connectedness of wetlands and indirectly responsible for the complexity and diversity of habitats through its effects on topography and soils. Natural resource managers recognize the importance of dynamic hydrology to wetlands and waterfowl-habitat relationships (Fredrickson and Heitmeyer 1988).

REGIONAL SILTATION OF AQUATIC ECOSYSTEMS

Deforestation and hydrologic alteration have degraded aquatic systems, including lakes, rivers, sloughs, bays, and sounds. Clearing of bottomland hardwood forests has led to an accelerated accumulation of sediments and contaminants in aquatic systems. Sediment now fills many water bodies, greatly reducing their surface area and depth. Non-point source runoff of excess nutrients and contaminants is also threatening the area's aquatic resources. Increased turbidity, caused by the sediment influx, limits light penetration in the water column, which consequently limits the growth of submerged aquatic vegetation. The federally listed threatened and endangered animal species

include four species of aquatic organisms as threatened and ten species as endangered that inhabit the coastal plain of North Carolina (Table 3).

Drainage ditches in coastal marsh habitats expose more areas of the marshes to fluctuations in water levels with tidal cycles. As the tides come into the marsh, water saturates more soil on ditch banks. As the tide goes out, the banks erode and the tides carry sediments into the bays and sounds. Over the years, this erosion results in a loss of wetland acreage.

REGIONAL PROLIFERATION OF INVASIVE AQUATIC PLANTS

Compounding the problems faced by aquatic systems is the growing threat from invasive aquatic vegetation. Static water levels caused by the lack of annual flooding and reduced water depths, resulting from excessive sedimentation, have created conditions favorable for the establishment and proliferation of several species of invasive aquatic plants. Additionally, the introduction of exotic (non-native) vegetation capable of aggressive growth is further threatening viability of aquatic systems. These invasive aquatic species threaten the natural aquatic vegetation important to aquatic systems, and choke waterways to a degree that limits biodiversity and often prevents recreational use. Common reed (*Phragmites australis*) is the most dominant of these plants on the Outer Banks and the refuge, and it has a negative impact on the marshes in the area.

REGIONAL CONSERVATION PRIORITIES

The declines in the area of the South Atlantic Coastal Plain's bottomland hardwood forests and their associated fish and wildlife resources have prompted the Service to designate this forest type as an area of special concern. These areas are of particular concern as habitat for neotropical migratory songbirds that only breed in the interior of large forested areas. They also provide habitat for fish-eating raptors that require forested habitat close to water in which to perch and from which to fish. The forests protect the aquatic habitat for interjurisdictional fish and other aquatic organisms. Much of the development has been for crop production and these areas may have potential for restoration. Many government habitat restoration programs focus on bottomland forests.

In the Outer Coastal Plain, the loss of marshes, pocosins, and nonriverine hardwood forests has not been as great in acreage or percentage of habitat lost, but there was originally much less of these habitat types. Although wetland protection legislation regulates development in marshes, the public desires to live and recreate in these areas and destruction thus continues. Pocosins and nonriverine hardwood forests have been logged, cleared, and drained for crop production. The fish and wildlife species associated with these habitats are in much greater jeopardy than those associated with bottomland hardwood forests because the potential for restoring these habitats is lower than it is for bottomland forests since the habitat loss is due to land use conversion to residential, commercial, and agricultural development. Conservationists must mitigate habitat loss by intensive management of the habitat that remains with practices such as prescribed fire and water management.

A collaborative effort involving private, state, and federal conservation partners is now underway to implement a variety of tools to restore the functions and values of wetlands in the South Atlantic Coastal Plain. The goal is to prioritize and manage wetlands to most effectively maintain and possibly restore the biological diversity in the South Atlantic Coastal Plain. Through cooperative efforts, apportioning resources, and the focusing of available programs, conservationists can improve the South Atlantic Coastal Plain's biological diversity.

Conservationists have initiated several coordinated efforts to set priorities and establish focus areas to overcome the impacts of hydrologic changes and forest fragmentation. Conservation organizations and agencies established a cooperative private-state-federal partnership, known as the North American Waterfowl Management Plan, Atlantic Coast Joint Venture, in 1988 to help provide sufficient wintering waterfowl habitat throughout the Atlantic Coastal Plain.

The initial Atlantic Coast Joint Venture effort for waterfowl has expanded to also establish breeding bird objectives for shorebirds and neotropical migratory birds. Partners-in-Flight has developed bird conservation plans to focus a number of private, state, and federal restoration programs into specific areas in an effort to provide maximum program benefits for neotropical migratory birds.

One of the biggest challenges to the management and restoration efforts underway in the South Atlantic Coastal Plain, and one that affects refuges in particular, is the need to meet long-term management objectives that address comprehensive ecosystem needs. These needs include those of wintering migratory waterfowl, neotropical migratory birds, shorebirds, large mammals, and other wide-ranging species. Often, management for one species or species group conflicts with the management objectives for another species or species group. Biologists must exercise caution to avoid management and restoration actions that are difficult to reverse and fail to meet the long-term, comprehensive management needs of the ecosystem or a specific area within the ecosystem. As an example, management of Swanquarter NWR for herbaceous wetlands to increase waterfowl diversity may overlook the critical habitat needs of neotropical migratory songbirds that prefer a shrubby habitat.

Active management of wetlands, moist-soil areas, and croplands on both public and private land is necessary to meet the habitat goals of the Atlantic Coast Joint Venture (Reinecke and Baxter 1996). The management (i.e., vegetation manipulation and hydrology restoration) helps compensate for the spatial and temporal habitat changes that deforestation and hydrologic alterations have caused throughout the South Atlantic Coastal Plain. Appropriately managed, Swanquarter National Wildlife Refuge will make a substantial contribution to meeting the objectives of the Atlantic Coast Joint Venture. Setting habitat and species objectives from the perspective of the South Atlantic Coastal Plain is advantageous because it looks at the big picture and enables managers to plan and provide habitat for a diversity of species throughout their range.

PHYSICAL RESOURCES

CLIMATE

Since the flow of air over North Carolina is predominantly from west to east, the continental influence is much greater than the ocean or marine influence. Therefore, the state experiences a fairly large variation in temperature from winter to summer.

The Gulf Stream current flows only a short distance off the North Carolina coast. One might think this "river" of warm water would have a profound effect on the climate, which is true to a degree. Temperatures on the coast are typically warmer in winter months and cooler during summer months than mainland Hyde County due to the temperature of surrounding waters.

Lows sometimes reform along the coast as "Cape Hatteras lows" and then move north along the coast. Winter's low-pressure storms are usually more intense because of the large north-to-south contrasts. Winter's storms bring prolonged periods of steady rain and are responsible for most of the winter precipitation. The forms of precipitation in spring begin to change from these steady rains to occasional thunderstorms. The Gulf of Mexico's warm, moist air produces warm, humid weather throughout the summer. Rainfall comes from occasional thunderstorms. Autumn, North Carolina's

driest season, is to many people the most pleasant with its many clear, warm days and cool nights with little rain. This weather usually lasts until November. Winter is cool and has brief occasional cold spells. Snowfall is not common.

The average annual precipitation is 52.50 inches. Rainfall is evenly distributed throughout the year: average monthly rainfall ranges from 3.24 inches in April to 6.50 inches in August. The average seasonal snowfall is about 0.7 inches. The record snowfall was 4.0 inches at New Holland on January 8, 1973. Twelve inches fell on the Outer Banks on January 23, 2003. Twenty-five inches is the record at Elizabeth City, North Carolina.

Of the total annual precipitation, about 26 inches usually fall in May through September. The growing season for most crops falls within this period. Thunderstorms occur on about 43 days each year. Every few years, a hurricane or tropical storm crosses the county, bringing 1 to 3 days of intensive rainfall.

The average relative humidity in mid-afternoon is about 65 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time in summer and 50 percent of the time in winter. The prevailing wind is from the north to northeast. Average wind speed is highest, 12 miles per hour, in winter.

The average daily maximum temperature at the New Holland weather station from 1971-2000 was 71.5 degrees F, and the average daily minimum is 51.2 degrees.

In January the average temperature is 42.9 degrees, the average daily maximum is 53.0 degrees, and the average daily minimum temperature is 32.7 degrees. The lowest temperature on record, which occurred at New Holland on January 21, 1985, is 12 degrees below zero. In July the average temperature is 79.4 degrees, the average daily maximum temperature is 88.2 degrees, and the average daily minimum temperature is 70.5 degrees. The highest recorded temperature, which occurred on July 20, 1977, is 100 degrees.

The average last freezing temperature in spring is March 24. The average first freezing temperature in the fall is November 21. The average growing season is 241 days.

GEOLOGY AND TOPOGRAPHY

Swanquarter NWR is the product of wetland community development following the Wisconsin Ice Age 15,000 years ago. Prior to this Ice Age, the level of the Atlantic Ocean in the Southeast was higher than it is presently. During the Wisconsin Ice Age, the sea level dropped to its current level and exposed large areas of the continental shelf. As a result, fast flowing rivers cut through the coastal plain terrace to the Atlantic Ocean. During the next several thousand years, as the ice receded, sea levels gradually raised. During this period it is believed river flows were slowed and organic sediment loads were deposited in the interstream areas as flowing systems shifted to slow-moving streams (Daniel 1981). Aquatic plants began to grow in these shallow bodies of water, adding to the accumulation of sediment and aquatic debris. Simultaneous with this buildup of organic sediments, a climatic warming trend accompanied the end of the Ice Age (Whitehead 1972). This warming trend helped to eliminate the cooler climate boreal forests and replace them with swamps, bogs, marshes, and pocosin habitats. Logging and land clearing activities over the last 300 years have greatly altered all habitat types.

The refuge lies in the Pamlico Terrace, an extensive low flat plain lying east of the Suffolk Scarp, a prehistoric Atlantic Ocean shoreline. The terrace slopes from 10 to 16 foot elevations at the base of the scarp gently eastward to 1 to 2 feet at the end of the land peninsulas. The Suffolk Scarp separates the Pamlico Terrace of the main estuarine region from the higher Inland Coastal Plain around the western-most segment of the Albemarle Sound system.

Streams in this area have relatively small sediment loading. Suspended sediments are mixed with organic sediments from swamp forests and marshes. This mixture of sediments produces the dominant bottom sediment of the area sounds. This sediment contains up to 15 percent organic matter (Griese et al., 1979) and is deposited within the standing waters of the estuaries.

Brown to black, organic-rich muds predominate in the surrounding sounds, but grade laterally into a thin apron of fine sand in the shallow waters around the perimeter of the estuaries. The sand apron usually occurs landward of the main break in the bottom slope at a depth of about 3 feet, and extends to the shoreline. The sediments in front of the marshes generally have little sand. They are characterized by high organic contents and contain peat blocks, logs, and stumps (Copeland et al., 1982).

SOILS

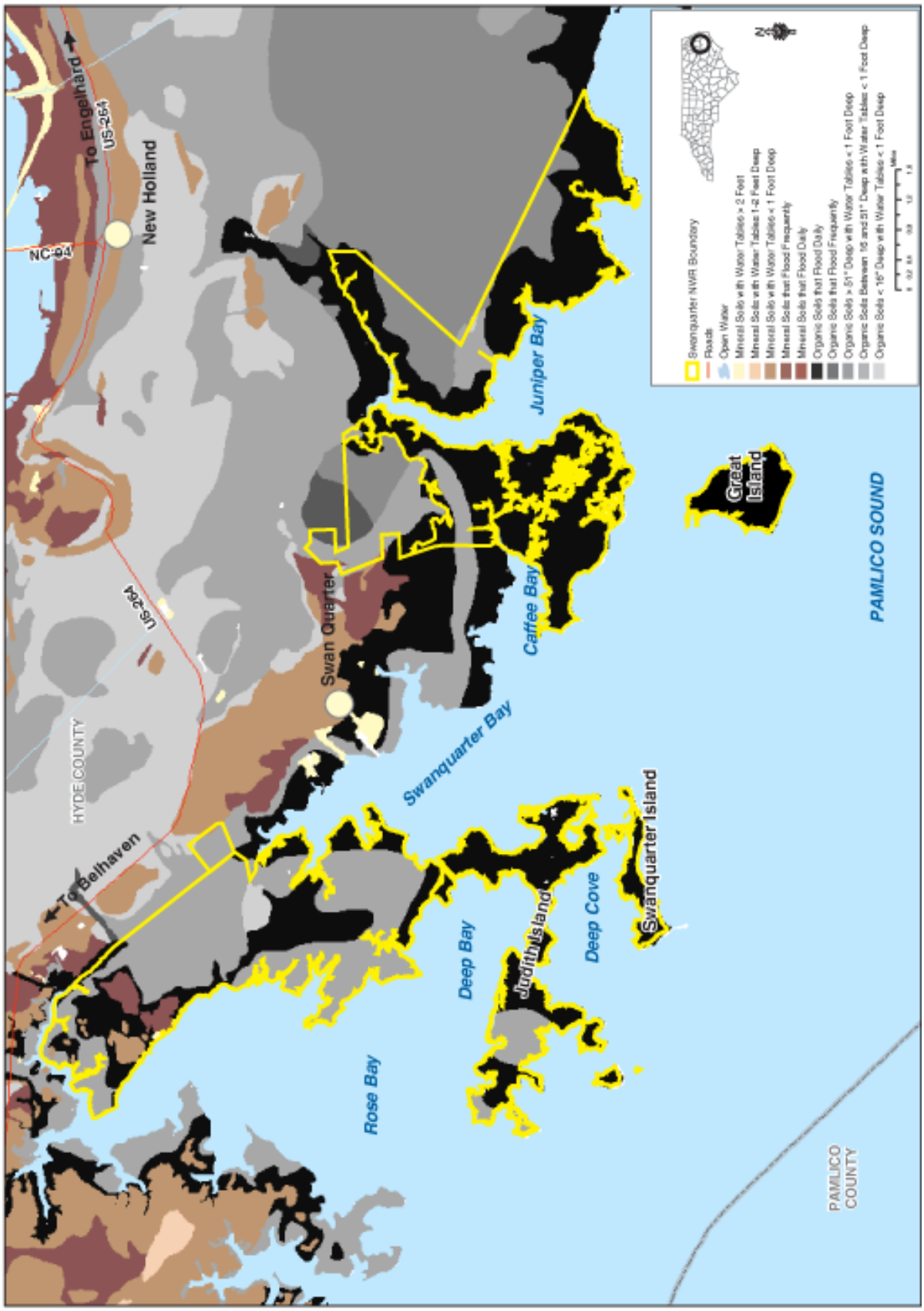
Soil types identified on the refuge are Argent loam*, Backbay mucky peat*, Belhaven muck*, Brookman loam*, Delway muck*, Dorovan muck*, Hyde silt loam*, Longshoal muck*, Pungo muck*, Roper muck*, Scuppernong muck*, Stockade sandy loam*, Udorthents, and Yonges loam*. (USDA, Soil Conservation Service, 2001) (Table 4). Soils with an asterisk are listed as hydric in 'Hydric Soils of the United States' (USDA Soil Conservation Service 1985) (Figure 4). Hydric soils are . . . "soils that in their undrained condition are saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophilic (water loving) vegetation" (USDA Soil Conservation Service 1985). These soils have seasonally high water tables within a foot of the surface of the soil.

The wetlands typical of the area are characterized by deep organic soils known as mucks or peats. The depth of organic soil depth over mineral soil, though not evident at the surface, has a tremendous influence on the potential uses of the land. Typically, the deeper the muck surface layer, the shorter the vegetation in the native plant community growing on the soil. The dominant species in the plant communities are dense shrubs tolerant of the wet, acid soils. Tall trees are unable to establish their deep root systems on the deep organic soils. Wind easily topples trees that do grow on the deep organic soils. Over the years, evolution has selected trees that are shorter. Formation of peat is an ongoing process in areas sufficiently wet to prevent oxidation of organic matter deposited by plants.

There are 9,200 acres of soils with more than 51 inches of muck over mineral soil identified on the refuge: Pungo (1,200 acres, 7 percent of the land area of the refuge), Longshoal (7,900 acres, 5 percent), Dorovan (100 acres, 1 percent). These soils are excessively wet. Longshoal and Dorovan flood frequently; Pungo rarely floods. They are characterized by layers of peat over mineral soil, and are mostly unsuitable for agriculture (Skaggs et al., 1980; Lilly 1981). Marshes and low pocosins dominate these soils.

The following soils have surface layers of 16 to 51 inches of muck: Belhaven (1,300 acres, 8 percent), Delway (3,000 acres, 18 percent), and Scuppernong (500 acres, 3 percent). These soils are also excessively wet. Delway floods frequently; Belhaven and Scuppernong rarely flood. They are also characterized by layers of peat over mineral soil, and are mostly unsuitable for agriculture (Skaggs et al., 1980; Lilly 1981). The productivity of the maple, gum, and bald cypress forests is lower on these soils compared to mineral soils with less than 16 inches of organic soil. With appropriate drainage and bedding,

Figure 4. Characteristics of soils of Swanquarter NWR



productivity can be increased. However, the refuge would not likely engage extensively in such practices on these deep organic soils owing to accelerated oxidation of peat and release of nitrogen and mercury – a negative impact on water quality.

Backbay (1,500 Acres, 9 percent) and Roper (200 acres, 1 percent) have less than 16 inches of muck over mineral soil. The native vegetation on these soils is the maple, gum, and bald cypress forest typical of that on wet mineral soils and the productivity of the soils are similar to mineral soils. When drained, these soils are among the most productive agricultural soils in the area. The USDA Natural Resources Conservation Service classifies Scuppernong as a prime farmland soil.

Mineral soils make up 711 acres (4 percent) of the land area of the refuge. Brookman loam, Argent loam, and Stockade sandy loam each have approximately 200 acres. Hyde silt loam and Yonges loam each have 50 acres. Most mineral soils are more productive than organic soils for crops as well as forest trees. Most on the refuge are poorly drained and rarely flood. They would grow loblolly pine, bald cypress, swamp black gum, red maple, sweet gum, water oak, willow oak, and swamp white oak. The USDA Natural Resources Conservation Service classifies Argent, Brookman, Hyde, Stockade, and Yonges as prime farmland soils if drained.

The Udorthent soils are well drained to droughty and are the soils under the refuge roads. Udorthents are the dredge spoils from canals and ditches.

Table 4. Characteristics of soils of Swanquarter NWR

Series	Approximate Acreage	Surface Texture	Muck Depth	Water Table Depth	Flooding Frequency
Pungo	1,200	Muck	80”	0-1.0’	Rare
Longshoal	7,900	Muck	72”	0-0.5’’	Very Frequently
Dorovan	100	Muck	70”	0-0.5’	Frequent
Belhaven	1,300	Muck	40”	0-1.0’	Rare
Delway	3,000	Muck	36”	0-0.5’	Very Frequent
Scuppernong	500	Muck	33”	0-1.0’	Rare
Backbay	1,500	Mucky Peat	14”	0-0.5’	Very Frequent
Roper	200	Muck	13”	0-1.0’	Rare
Hyde	50	Silt Loam	None	0-1.0’	Rare
Yonges	50	Loam	None	0-1.0’	Rare
Brookman	200	Loam	None	0-1.0’	Rare
Argent	200	Loam	None	0-1.0’	Rare
Stockade	200	Sandy Loam	None	0-1.0’	Rare
Udorthents	11	Sand	None	0-6.0’	Rare
Total	**16,411**				

Hydrology

Swanquarter NWR is within the Tar Pamlico River Basin. Freshwater creeks and streams drain to Rose Bay, Swanquarter Bay, Juniper Bay, and other smaller bays within the proclamation boundary.

Groundwater provides the freshwater resources for the area. Studies have shown that the groundwater reservoir consists of two types of aquifers: a water table aquifer, which extends from the land surface to the first confining beds of silt and clay, and a confined, or semi-confined aquifer beneath and between the silt and clay beds. The water table aquifer ranges in thickness from 10 to 50 feet and averages 15 feet. The water table itself averages 3 feet above mean sea level.

Maintenance of the fresh groundwater depends on the amount of rainfall. Due to the sandy nature of the soils, rainfall enters the water table aquifer with little or no surface runoff. However, after the ground has become saturated during periods of intensive rainfall, some runoff occurs in roadside ditches and small intermittent freshwater ponds.

The deeper confined aquifers are as much as 30 feet thick and are below the first confining beds whose thickness ranges from 5 to 20 feet. Exact thicknesses are difficult to determine due to the gradational nature of sediments below the water table aquifer.

The fresh groundwater is best described as a lens-shaped mass floating on top of denser salt water. The amount of fresh water in this lens varies depending on the amount of recharge and discharge. Between the fresh water and salt water, a zone of brackish water occurs. This zone periodically changes due to flooding, tidal movement, and rainfall.

Most of the refuge lies within a few feet of sea level, and marshes cover the majority of the refuge. Flooding resulting from sea level rising could be a long-term problem for the Swanquarter NWR. Over the last 100 years the sea level has risen approximately one foot. Experts agree that the sea level will rise another two feet over the next 100 years, with a maximum increase of as much as four to seven feet. (Source: The Probability of Sea Level Rise. James G. Titus and Vijay Narayanan. 1995. Washington, D.C.: U.S. Environmental Protection Agency. 186 pp. EPA 230-R95-008). A rise in sea level would alter the habitat, changing marshes into open water areas, and upland areas into marshes. As the habitat changes, the wildlife will also change. The fresh groundwater aquifer would be even more susceptible to saltwater intrusion because of the expected sea level rise. The refuge can do little to affect this issue, but can realize that it is occurring and adapt management as hydrology and plant communities change.

AIR QUALITY

The area closest to the refuge that an environmental agency monitors is the Virginia Beach-Norfolk, Virginia metropolitan area. The Environmental Protection Agency monitors carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide and particulates in Norfolk, Virginia Beach, Hampton, Newport News, Suffolk, and Chesapeake. Despite the large population, industry, traffic, and power plants, the area exceeded only ozone level standards in 2002. Monitoring has indicated unhealthy levels only twice and unhealthy levels for sensitive groups thirteen times. The relatively good air quality is due to the breezes blowing through the area from the ocean.

Prescribed burning on the refuge has the potential to have an impact on air quality. The State of North Carolina specifies that prescribed fires purposely set to marshes for marsh management practices acceptable to the North Carolina Division of Forestry and the Environmental Management Commission are permissible if not prohibited by ordinances and regulations of governmental entities

having jurisdiction. The regulation also includes a disclaimer that addresses certain potential liabilities of burning even though permissible.

WATER QUALITY

The state has classified the water bodies and streams according to their water quality and the uses that quality supports. All of the waters in and around Swanquarter NWR are Outstanding Resource Waters (ORW) or High Quality Waters (HQW). The classifications of waters surrounding the refuge are listed in Table 5. According to the 2006 North Carolina 303(d) List, some of these waterbodies are impaired. Portions of Juniper Bay, Northwest Creek (a tributary to Juniper Bay), portions of Swanquarter Bay, a segment of Oyster Creek (tributary to Swanquarter Bay), portions of Rose Bay and Rose Bay Creek are listed for shellfish harvesting closure due to fecal coliform.

There is one National Pollution Discharge Elimination System (NPDES) permitted facility that discharges into waters adjacent to the refuge. The Rose Bay Oyster Company discharges to Rose Bay Creek on the western perimeter of the refuge.

Table 5. Classifications of water bodies and streams surrounding the Swanquarter NWR

Water Body or Stream	Classification	Best Uses
Rose Bay Rose Bay Creek Deep Bay Old Haulover Bernice Creek Middle Creek	HQW – High Quality Waters SA – Shellfishing Waters	Shellfishing, and Primary and Secondary Recreation
Pamlico Sound Swanquarter Bay Shingle Creek Cowpen Creek Oyster Creek Juniper Bay Northwest Creek Rattlesnake Creek Old Haulover Doe Creek Buck Creek Laurel Creek	ORW – Outstanding Resource Waters SA – Shellfishing Waters	Shellfishing, and Primary and Secondary Recreation
Juniper Bay Creek	ORW – Outstanding Resource Waters SC – Protected for Secondary Recreation	Secondary Recreation (Not Swimming)

BIOLOGICAL RESOURCES

HABITAT

Human development activities have affected plant communities on the refuge over time. Some of these activities occurred before the Service established the refuge and some have occurred since. Logging and land clearing activities over the last 300 years have greatly altered all habitat types. Most notable today are the roads and the former site of the administration building near the Bell Island Pier. However, the refuge's undisturbed saltmarsh islands and forested wetlands interspersed with potholes, creeks, and drains contain many important wildlife and ecological resources. Since clear-cutting, peat mining, and agricultural conversion have developed much of the Albemarle-Pamlico peninsula, this area remains as important wildlife habitat in eastern North Carolina. Over half of the refuge is marsh land included in the National Wilderness Preservation System. Marsh vegetation on the refuge is dominated by black needlerush and sawgrass while the mainland is forested by loblolly pine, pond pine, and bald cypress. An additional 27,082 acres of adjacent, non-refuge open water are closed by Presidential Proclamation to the taking of migratory birds.

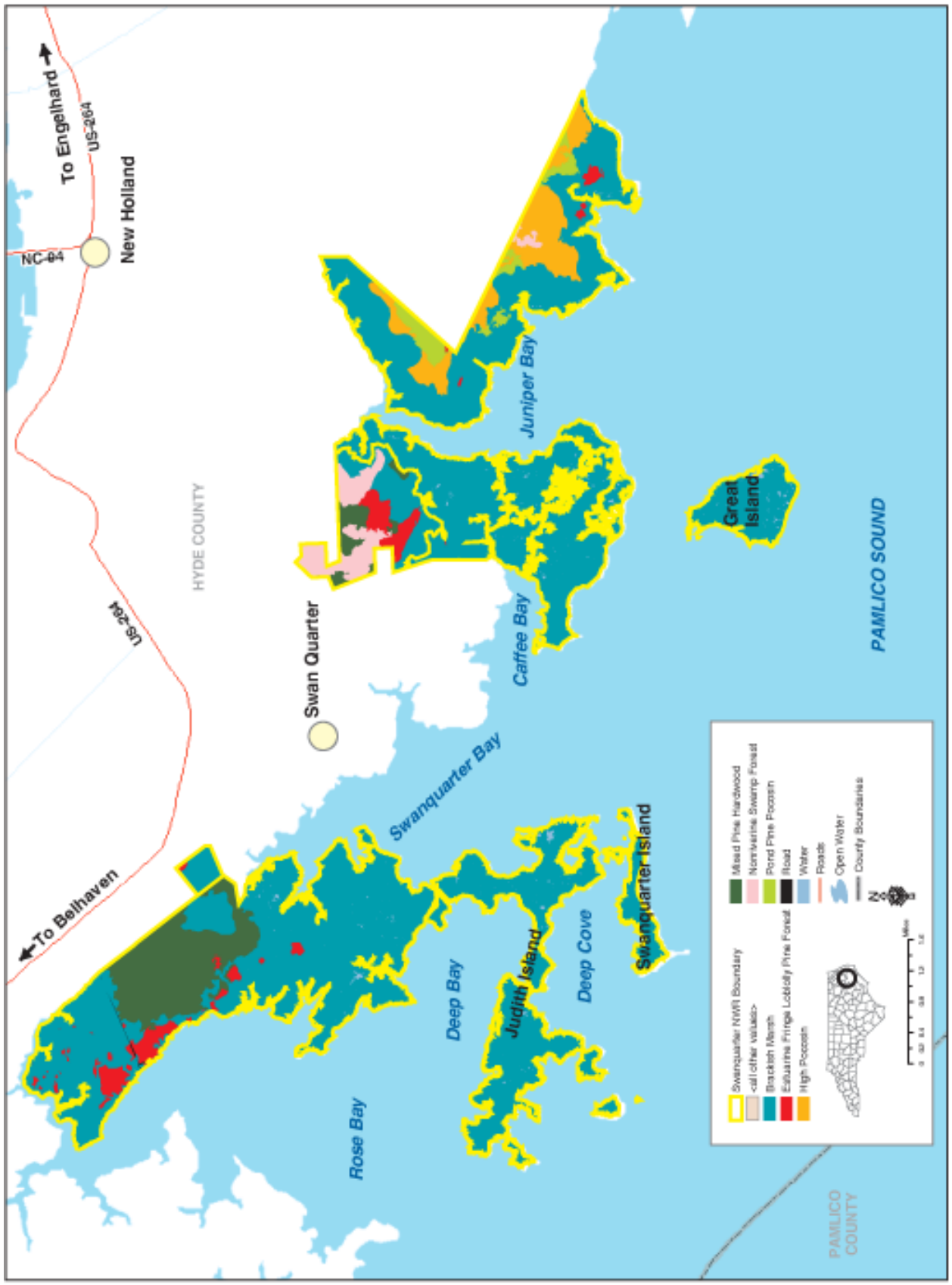
Swanquarter NWR is an important estuarine and wilderness resource; together with the surrounding proclamation waters it provides winter sanctuary for black ducks and canvasbacks, redheads and scaup. Additionally, it provides habitat for nesting osprey and colonial waterbirds. It also supports one of the northernmost populations of the American alligator. Hyde County, in which Swanquarter NWR lies, is a stronghold for the black bear in North Carolina and the mid-Atlantic coast. The refuge also has the potential for habitat for the endangered red-cockaded woodpecker, currently hosts bald eagles, and is located within the red wolf reintroduction area.

In recent years, the staff has utilized prescribed fire to maintain plant communities and successional stages on part of the refuge. There are eight habitat types/land uses found on the refuge (Table 6 and Figure 5) which are described subsequently. There are no known threatened or endangered plants on Swanquarter NWR. However, the Sensitive Joint Vetch has been documented as occurring in mainland Hyde County within the last 20 years near Swanquarter NWR.

Table 6. Acreage by habitat or land use under fee title ownership at Swanquarter NWR

Habitat	Acreage
Brackish Marsh	13,000
Mixed Pine Hardwood Forest	1,300
High Pocosin	750
Estuarine Fringe Loblolly Pine Forest	500
Nonriverine Swamp Forest	400
Pond Pine Pocosin	300
Open Water	150
Administrative Areas	11
Total Acres	16,411

Figure 5. Vegetative habitat types of the Swanquarter NWR



Brackish Marsh

The brackish marsh community is found along the margins of sounds and estuaries in areas not subjected to regular flooding by salt water. This community is often referred to as "high marsh" and is subjected to irregular flooding mostly from wind tides along the Pamlico Sound. Salinity in the brackish marsh is generally low due to distance from a saltwater source and freshwater inflow, but can be mid-range for brief periods. If a brackish marsh occurs in an area subjected to regular flooding with low salinity water, mineral deposition can result in mud flats. Vegetation in the brackish marsh community is strongly dominated by black needlerush (*Juncus roemerianus*), but patches of saltmeadow grass (*Spartina patens*) and salt grass (Distichlis spicata) can be found. In some areas patches of giant cordgrass (*Spartina cynosuroides*) and common reed *(Phragmites australis)* occur and can be extensive in a few areas. Sawgrass (*Cladium jamaiciense*) is the dominant species in large tracts of marsh on the north side of the refuge and can be found throughout. One may also find cattails (*Typha* spp.), wax myrtle (*Morella cerifera*), bulrush (*Scirpus* spp.), sedges (*Carex* spp.), and spikerushes (*Eleocharis* spp.). As salinity increases, this community can grade into salt marsh on the edge of the Sound; if salinity decreases, it grades into freshwater marsh on the northern edge of the refuge. Brackish marsh occupies 13,000 acres on organic soils throughout the refuge (Table 6, Figure 5). On 2,000 acres, shrubs make up a substantial portion of the marsh due to the exclusion of fire.

Estuarine Fringe Loblolly Pine

This plant community features an overstory of loblolly pine (*Pinus taeda*) and an understory that varies with fire frequency. In the absence of fire, the understory is dominated by wax myrtle (*Morella cerifera*) and inkberry (*Ilex glabra*). With regular natural or prescribed fire, the understory is saltmeadow cordgrass (*Spartina patens*). The habitat occurs on saturated mineral or organic soils that rarely flood. The stand on the refuge has been damaged extensively by the wind and salt spray from Hurricane Isabel in September 2003. Estuarine fringe loblolly pine occupies 500 acres, mostly on mineral soils on the western edge of the refuge (Table 6, Figure 5).

High Pocosin

The high pocosin community is associated with deep to intermediate depth organic soils, primarily in a transitional zone between low pocosin and the pond pine pocosin. The shrub layer is the dominant feature of this community. However, shrubs tend to be taller (10 to 15 feet) than those in low pocosins and trees, mostly pond pine (*Pinus serotina*), may grow up to 30 to 40 feet. Bitter gallberry (*Ilex glabra*) and fetterbush (*Lyonia lucida*) dominate this shrub layer with Virginia chain-fern (*Woodwardia virginica*) being the most abundant herbaceous plant. Other shrub species may include wax myrtle (*Morella cerifera*) and groundsel tree (*Baccharis halimifolia*), especially on edges and in areas of disturbance. Red bay (*Persea borbonia*) and loblolly bay (*Gordonia lasianthus*) may be found, but are uncommon. High pocosin occupies 750 acres, mostly on deep organic soils on the eastern edge of the refuge (Table 6, Figure 5).

Mixed Pine Hardwood Forest

Hardwood/Mixed pine is found in scattered areas throughout the refuge. Red maple (*Acer rubrum*), red bay (*Persea borbonia*), and swamp tupelo (*Nyssa biflora*) are dominant hardwood trees with an average height of 50 to 60 feet. Pond pine (*Pinus serotina*) and loblolly pine (*Pinus taeda*) are the pine species present. Dominant shrubs are fetterbush (*Lyonia lucida*), bitter gallberry (*Ilex glabra*), and sweet bay (*Magnolia virginiana*). Typically little or no herbaceous vegetation is present. River cane (*Arundinaria gigantea*) may be found in some locations. Mixed pine hardwood forest occupies 1,300 acres, mostly on organic soils of intermediate depth in the northwestern part of the refuge (Table 6, Figure 5).

Nonriverine Swamp Forest

This habitat type occurs on shallow organic soils found primarily in the flats of the refuge between streams. These areas occur mostly on the margins of peatlands, grading into cypress-gum swamps, Atlantic white cedar forests, or pond pine pocosin habitat types. Various soft mast-producing hardwood trees, typical of bottomland hardwoods, dominate this forest. A long history of poor logging practices has further degraded this habitat type. However, a tree canopy of swamp tupelo (*Nyssa biflora*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), green ash (*Fraxinux pennsylvanica*), and loblolly pine (*Pinus taeda*) dominates the forest in the natural state. Tulip poplar (*Liriodendron tulipfera*), persimmon (*Diospyros virginiana*), shagbark hickory (*Carya ovata*), and serviceberry (*Amelanchier canadensis*) may also be found. Dominant understory vegetation includes American holly (*Ilex opaca*), deciduous holly (*Ilex decidua*), blueberry (*Vaccinium corymbosum*), sweet pepperbush (*Clethra alnifolia*), sweet and bitter gallberry (*Ilex glabra* and *coriacea*), and fetterbush (*Lyonia lucida*). The ground layer may have cane, netted and Virginia chain fern, (*Woodwardia virginica),* royal fern (*Osmunda regalis*), ebony spleenwort (*Asplenium platyneuron*), and partridgeberry (*Mitchella repens*). Common woody vines are greenbrier (*Smilax spp*.), grape (*Vitis spp*.), poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and cross vine (*Bigninia capreolata*). Nonriverine swamp forest occupies 400 acres, mostly on organic soils of intermediate depth in the north central part of the refuge (Table 6, Figure 5).

Pond Pine Pocosin

Pond pine pocosin is very similar to the high shrub pocosin, but contains more pond pine *(Pinus serotina)*, bays (*Persea spp., Gordonia spp., Magnolia spp*.), and red maple (*Acer rubrum*). Red bay (*Persea borbonia)* and loblolly bay (*Gordonia lasianthus*) also reach heights greater than 20 feet in this cover type. Mature tree heights, including red maple (*Acer rubrum*), may vary from 30 to 40 feet. Fetterbush (*Lyonia lucida*) and bitter gallberry (*Ilex glabra*) are the dominant shrubs with Virginia chain-fern (*Woodwardia virginica*) as the dominant herbaceous plant where openings occur. Grasses, sedges, and other herbaceous species are rarely present due to the dense shrub understory. Pond pine occupies 300 acres, mostly on deep organic soils on the eastern edge of the refuge (Table 6, Figure 5).

Administrative Areas

The site of the former administrative buildings near the Bell Island Pier, the entry road and gravel spur road, the Bell Island Pier parking area, and roadsides make up the administrative areas of the refuge. Very little maintenance is required of these areas. The vegetated roadsides are mowed frequently enough to maintain visibility along roads, but not intensively enough to threaten vegetative cover. Roadsides do fragment natural habitat and create corridors along which exotic and invasive plants thrive and spread.

WILDLIFE

General

Swanquarter NWR and its surrounding waters support many species of resident and migratory fish and wildlife. Of these, 48 species are fish (Hester and Copeland 1975, Johnson et. al 1980), 145 are birds, 48 are reptiles and amphibians, and 40 are mammals. The refuge supports wildlife species that are important from both a regional and a national standpoint. Its large size and vegetative diversity make the refuge a haven for species that require aquatic and wetland habitats.

Birds

Swanquarter NWR provides habitat for a wide variety of birds. Because of the refuge's large size and plant community diversity, habitat is provided for forest-dwelling species, as well as marsh dwelling species. This somewhat unique complex of various wetland habitat types results in the presence of some unique avian forms such the Wayne's black-throated green warbler, a distinct form of prairie warbler, and an unusually dense population of worm-eating warblers (Watts & Paxton, 2002). There are approximately 250 species of birds that visit regularly with about 40 to 50 additional species considered accidental visitors.

The area is roughly at midpoint in the Atlantic Flyway and is a much used and valuable feeding and resting area for numerous species of wintering waterfowl. Tundra swans, coots, and more than twenty-five species of ducks winter either on the refuge or in the sounds and rivers adjacent to the refuge. Populations of migratory waterfowl peak during the months of November through February. In addition to waterfowl, large numbers of hawks, owls, and many species of passerine birds may be seen. Avian species composition changes throughout the year since most are migratory.

*Waterfowl***.** Pamlico Sound provides open water for resting, feeding, and escape cover. The wood duck is a common year-round species and is most often associated with the shorelines, wooded swamps, and ditches. Black ducks nest on the numerous ponds found throughout the extensive marshes on the refuge and are part of an important regional breeding population. The most prevalent wintering species residing in refuge marshes include pintail, green-winged teal, gadwall, widgeon, mallard, and black duck. Large "rafts" of black scoter and lesser scaup are commonly observed on the open waters adjacent to the refuge. Other species wintering or migrating on the refuge and surrounding waters may include blue-winged teal, ring-necked duck, shovelor, canvasback, ruddy duck, red head, bufflehead, hooded merganser and red-breasted merganser. Both migratory Canada geese and snow geese use the refuge.

Breeding Birds. The species that breed on the refuge are characteristic of species that inhabit other coastal plain communities. They include warblers, nuthatches, thrashers, and blue-gray gnatcatchers. Wading birds, such as the great blue heron, are common and breeding has been documented in at least one rookery on the refuge. Bald eagles and ospreys have also historically nested on the refuge and viable nests remain.

Wintering Birds. The most common winter species are the American robin, yellow-rumped warbler, the red-winged blackbird, and sparrows. Robins feed heavily on berries of redbay and greenbrier and roost in large concentrations along the ditches. Myrtle warblers use vegetated ditch banks, and forest edges. They feed heavily on wax myrtle berries. The northern harrier may be observed hunting over the marshes.

Transient Species. Swanquarter NWR lies in the path of the Atlantic Flyway, a major migration route. The refuge provides resting and foraging areas for many migrantory species which winter farther south. Species which migrate through the refuge during the fall include: blue-winged teal; raptors, such as the broad-winged hawk and merlin; shore birds; and a variety of perching birds, such as the western kingbird, bank swallow, Swainson's thrush, warblers (yellow, magnolia, Cape May, black-throated blue, blackpoll and palm), bobolink, northern oriole, and rose-breasted grosbeak.

Mammals

Of the 47 species of mammals commonly occurring in the lower coastal plain of North Carolina, 42 occur on the refuge. The most common land mammals are the black bear, opossum, and rodents such as the hispid cotton rat. Semi-aquatic furbearers, such as the muskrat, nutria, and river otter, are also common. Numbers of beaver are increasing. The white-tailed deer population has remained relatively constant at low numbers in recent years. However, deer herd health checks at 5-year intervals show that the population is at or very near carrying capacity for pocosin habitat. The black bear population is among the highest density populations in the southeast. Numerous sightings of eastern cougar have been reported, but none have been confirmed.

American Black Bear. Today the Albemarle-Pamlico Peninsula has what is believed to be one of the largest concentrations of black bear found in the southeastern United States. The population had declined in this and other areas due to human disturbance and habitat destruction (Hamilton 1978). According to Hamilton and Marchiuto (1977 and 1978), protection of major wetland forest types is critical to the continued maintenance of the Coastal Plain bear population.

Little information is known on the numbers and characteristics of the refuge's black bear population. In 1974, Hardy suggested a Dare County bear population of 25 to 35 individuals of which 13 to 20 were adult males, 4 to 8 were adult females, and 5 to 9 were juveniles. There was very little evidence of reproductive success. The population imbalance probably resulted from selective mortality engendered by excessive hunting.

High hunting pressure associated with increased access through road construction was the apparent mechanism that reduced the bear population on and off the refuge. In the 1970s, state legislation made it illegal to hunt black bear in the Coastal Plain. The population has increased steadily since then. The state legislature re-established a hunting season in 1992, but the season was not opened on the refuge due to insufficient population data. A research project on Alligator River NWR by the University of Tennessee from 1992 to 1996, resulted in good information on habitat use, food habits, and reproduction. During the same study, an attempt to estimate the population size was not successful due to low recapture numbers (Allen 1998). An effort to estimate the population through genetic analysis of hair samples on Alligator River and Pocosin Lakes NWRs began during 2001, by Virginia Tech, and data collection continued through 2004. That study concluded that the bear populations on the refuges were well above levels that are considered optimum in good habitat.

Limiting factors on black bear on the refuge have been identified as blackgum mast, disturbance, and availability of escape cover. Although blackgum fruit has been identified as limiting, the diet of the black bear varies with the seasons and availability of food. Spring foraging appears to be largely opportunistic with a high occurrence of ants and leaves in the diet. Blueberries and switchcane stems are preferred throughout the summer. Fall feeding shifts to blackgum, with winter diets consisting mainly of greenbrier, sumac, and gallberry (NCSU 1974).

White-tailed Deer. The white-tailed deer is probably the most sought after game species on the refuge. Hunters make extensive use of the area around the refuge for deer hunting. White-tailed deer are considered to be browsers because they primarily consume woody vegetation. However, whitetails will eat almost any available form of plant life. Because of this adaptability, it is impossible to single out one habitat as greatly superior to others. Interaction of deer and habitat is a combination of food preference and utilization, quantity and quality of food, and availability of cover (Halls 1984; Halls and Ripley 1961). However, best estimates suggest a much lower carrying capacity for pocosin habitat than other habitat types. For example, Monschein (1981) reported the best estimate for

pocosin habitat is about 6 deer per-square-mile; about 18 deer per-square-mile along pocosin borders; and 35-40 deer per-square-mile for coastal bottomland hardwoods. Basic differences involve the quantity, quality, and availability of food.

Since establishment of the refuges on the Albemarle-Pamlico Peninsula, periodic abomasal parasite counts, necropsy findings, laboratory tests, and general physical condition indicate that the health of the deer population is fair to good. It was concluded in 1985, 1992, and 1998 by the Southeastern Cooperative Wildlife Study that the Swanquarter NWR deer were within an optimal stocking density for the nutritional capacity of the habitat.

Furbearers. Swanquarter NWR provides habitat for fur-bearing species such as bobcat, otter, mink, gray fox, muskrat, nutria, and raccoon. Raccoon, nutria, muskrat, otter and mink make use of the ditches and streams that run through the refuge. The gray fox makes use of the edges feeding on small mammals as well as blackberries and other fruits. Bobcats are common predators on the refuge and are most commonly observed around the farm unit, along the edges of pocosin areas, and in swamp forests. They may be found throughout the refuge because of the presence of the marsh rabbit, the bobcat's main prey.

In addition to the mammals already mentioned, the refuge supports populations of the gray squirrel, cottontail rabbit, opossum, and several rodent and insectivore species.

Reptiles and Amphibians

There are 61 species of reptiles and amphibians reported for the refuge. Reptiles and amphibians are most numerous and diverse around permanent and semi-permanent open water, marshes, creeks, lakes, and ditches. They also thrive in disturbed or modified and transitional areas. Some of the species that inhabit the area are the brown, banded, and plain-bellied water snakes; common snapping, red-bellied and eastern painted turtles; and the southern leopard frog. Three venomous snake species have been documented on the refuge. They are the cottonmouth, canebrake (timber) rattlesnake, and copperhead. The pygmy rattlesnake has been documented in Hyde County but, even though the refuge is in Hyde County, none have been documented on the refuge.

American Alligator. The refuge is near the northern extent of the American alligator's natural range in North America. This endangered reptile occurs in refuge marshes, slow-moving streams, and man-made ditches. They prefer areas where water turbidity is low, water quality is high, and an adequate food source is present. The refuge’s drainage ditches provide prime alligator habitat.

Fish

Fisheries on and surrounding Swanquarter NWR are diverse and productive. The refuge's potholes, creeks, and drains support species characteristic of blackwater or oligohaline systems. Fish that inhabit the refuge include resident species, migratory species, anadromous species, and one catadromous species.

Resident species, such as gar, pickerel, white and yellow perch, a variety of sunfish, and catfish, inhabit the blackwater portions of the refuge. Spotted sea trout and redfish are commonly found in the shallow open waters of Pamlico Sound. Migratory species use the refuge's estuaries as spawning grounds and its surrounding waters as a nursery area. Migratory species that use the refuge include Atlantic croaker, spot, Atlantic menhaden, and the southern and summer flounders. Most of these species are commercially harvested elsewhere.

Anadromous species are those that spawn in the refuge's freshwater streams and estuaries, inhabit these areas as juveniles, mature offshore, and return to these streams to spawn as adults. These species use Pamlico Sound and the refuge's drainage ditches heavily. They include striped bass, alewife, and blueback herring.

Insect and Disease Pests

The gypsy moth is now well established as far south as northeastern North Carolina. The North Carolina Division of Plant Industry and United States Forest Service closely monitor gypsy moth populations. They use pheromone traps located throughout the Hyde County mainland and barrier islands, including refuge lands. When they detect large-scale outbreaks, they use integrated pest management techniques to suppress the outbreak, but not necessarily eliminate the species from the area. Although the refuge is within the quarantine area of northeastern North Carolina, there have not been any outbreaks of the gypsy moth requiring treatment at the refuge.

Since the mid-1990s, southern pine beetle outbreaks and cutting controlling buffers resulted in the conversion of over 5,000 acres of mostly pond pine habitat to shrub habitat. Without prescribed fire, this acreage will most likely remain as shrub habitat unless pond pine is planted after site preparation. During 2002 and 2003, the spread of southern pine beetle infestations was greatly diminished.

Exotic Organisms

At the present time, little is known about exotic organisms on the refuge. Feral cats and dogs can be found on the refuge but there is uncertainty as to numbers and extent of impact on wildlife.

Fire ants are an increasing problem but current control methods, using pesticides, are impractical and undesirable in a large roadless landscape such as the refuge.

Threatened and Endangered Species

Several federally listed species occur in the area. Among them are the red-cockaded woodpecker, red wolf, and American alligator. All species, except for the red-cockaded woodpecker, occur throughout the refuge.

The Service first reintroduced the red wolf in the region in 1987. Since the initial releases, wolves have reproduced in the wild and may be found throughout the refuge and four surrounding counties. Depending upon circumstances within and between packs, there can be from two to five packs of wolves on the refuge at a given point in time. An estimated 100 wolves now inhabit a 1.7 million acre area in eastern North Carolina.

The American alligator is listed as threatened by similarity of appearance in North Carolina and is found in aquatic habitat throughout the refuge.

CULTURAL RESOURCES

There have been limited archaeological investigations within the refuge. The staff conducts management activities so as to avoid compromising sensitive sites and requests an investigation before they plan any development.

SOCIOECONOMIC ENVIRONMENT

Swanquarter NWR lies within Hyde County, North Carolina. Recently made more accessible to the mainland by bridges and ferries and primarily supported by tourism, coastal Hyde and Dare counties have seen an influx of tourists, visitors, and residents over the last few decades. This considerable population growth and development of the barrier islands has brought substantial economic benefit to a region historically rural and impoverished. The mainland part of the county has not developed due the fact that 99 percent of the soil is hydric and 33 percent of it is organic and will not support structures. Despite the growth on the coast and with its location just south of U.S. Highway 264, the refuge has not seen greater recreational and public use. The Bell Island Pier does attract visitors when it is open for use, but hurricanes have damaged it often and the Service has closed it for extended periods of time after each storm. Much of the county has been cleared for agriculture. As one of the few remaining tracts of intact natural land, the refuge and, consequently, its management considerations, have become even more critical to the nature-based tourism in the county.

Swanquarter NWR and Hyde County are located in the northeastern part of North Carolina and are bounded by the Tyrrell County and Albemarle Sound to the north, Beaufort County to the west, and the Pamlico Sound to the south.

For many decades, Hyde County's Ocracoke Island has been in the forefront of economic growth and development in the State of North Carolina, and historically, unemployment has been lower than the state average. Seven million tourists visit the Outer Banks of Dare, Currituck, and Hyde counties every year. The next closest areas of economic growth and social life are Greenville, North Carolina, 100 miles west of the refuge, and Virginia Beach, Virginia, 100 miles north of the refuge.

Despite the growth on the Outer Banks, Hyde County is still predominantly rural, with the largest town being Engelhard (2000 population 1,561). Like other rural areas throughout the country, outdoor activities are both popular and necessary. Hunting, recreational fishing, and bird watching are popular pastimes, and commercial fishing is an important element of the economy. The importance of Swanquarter NWR and its appropriate management is, therefore, easily understood.

HISTORY

The inhabitants of Hyde County at the time of European settlement were also Coastal Algonkians called the Machapungo and Mattamuskeets. By the early 1700s, most of the Indians lived on a reservation in the eastern part of the county. In 1711 the number of Indians was about 30, and by 1761 only 6 remained.

English explorers first arrived in the county in 1585. The early history of the county was dominated by maritime trade and featured the exploits of Edward Teach, also known as Blackbeard the Pirate. The first settlers were castaways from ships.

The North Carolina General Assembly formed Hyde County from Bath County in 1705, and originally named it Wickam County. It named the county Hyde County in 1712, in honor of Edward Hyde, the first governor of North Carolina.

In the 1800s, residents built many plantation homes in the county. The best known is the Octagon House in the eastern part of the county. Due to its rich soil with an organic topsoil layer, Hyde County has always had a good reputation for agricultural production, especially in corn. People once traveled to the county from across the state for corn.

Agriculture has remained the most important part of the county's economy and lifestyle. The acreage in cropland increased dramatically in the 1970s, when soybean prices increased substantially. Much of that land was difficult to drain and maintain water levels necessary for production, and has been abandoned.

In the later part of the twentieth century, conservation agencies and organizations began to purchase areas less suited for agriculture and production forestry due to the deep organic soils. They manage those areas for wildlife habitat, the protection of unique ecological communities, and outdoor recreation. In 1932, Swanquarter NWR was established by presidential order. Recreation based on natural and cultural resources is a growing part of the local lifestyle.

LAND USE

Today Hyde County is 60 percent forested (235,800 acres), 24 percent cropland (95,327 acres), and 11 percent marsh (44,729 acres).

From 1997 to 2002, the land in farms increased 8 percent from 95,327 acres to 103,089 acres; the average size of farms decreased 25 percent from 953 acres to 716 acres; full-time farm operators increased 22 percent from 74 farms to 90 farms; total market value of agricultural products sold decreased slightly from $32,996,000 to $32,868,000; and average market value of agricultural products sold per farm decreased 31 percent from $329,965 to $228,251 (Table 7).

In 2002, corn and soybeans accounted for 31,059 and 30,013 acres of cropland, the largest crops in the county. Cotton and wheat have also been important crops in Hyde County (Table 8) (USDA, 2002).

DEMOGRAPHICS

Hyde County is primarily rural with a total estimated population of 5,826 in 2000 (U.S. Census Bureau 2000). The county population increased 7.7 percent between 1990 and 2000 (U.S Census Bureau, 2000). Swan Quarter, the county seat, is the largest town but the population is widely dispersed throughout the unincorporated areas of the county.

The population is 62.7 percent White, 35.1 percent Black, 2.2 percent Hispanic, 0.3 percent Native American, and 0.4 percent Asian (U.S. Census Bureau 2000). In 2000, the mean family income was $23,568, substantially below the state average of $35,320. The poverty rate was 24.8 percent of the population, well above the state average of 12.6 percent (U.S. Census Bureau 2000). The average unemployment rate in 2004 was 7.2 percent, well above the State of North Carolina unemployment rate of 5.5 percent (North Carolina Employment Security Commission 2004) (Table 9).

EMPLOYMENT

Lodging and food service and retail trade are the largest employers in Hyde County, employing 277 and 223 of the county's 1,044 employees with an annual payroll of $22.4 million in 2000 (U.S. Department of Commerce, County Business Patterns 2000). This is due in large part to the tourists attracted to the Outer Banks of Hyde County (North Carolina Economic Security Commission 2002).

In 2000, the sectors employing the largest numbers of persons were in decreasing order as follows: lodging and food service, retail trade, agriculture, manufacturing, construction, wholesale trade, health care, finance, forestry, fishing, real estate, administrative and support services, and recreation (U.S. Census Bureau, Economic Census 2000).

FORESTRY

Timber has always been a source of wealth for Hyde County. However, much of the timber was cleared in order to cultivate the land for corn, soybeans, and other crops.

Today, Hyde County is approximately 60 percent forested, with 235,800 acres of forestland. In comparison, 60 percent of North Carolina is forested. Fifty-two percent of the County's forest is in pine, 32 percent is in oak-gum-cypress, 11 percent is in oak-hickory, and 5 percent is in oak-pine (USDA Forest Service 2002).

In 2000, private landowners were the largest forest landowners with 55 percent of the county's forestland. The Federal Government owned 28 percent, the forest industry owned 15 percent, and the State Government owned 2 percent (USDA Forest Service 2002).

Table 7. Hyde County agricultural statistics from the 2002 USDA census of agriculture

Number of Farms	144
Acres in Farms	103,089
Average Size of Farms (Acres)	716
Market Value of Land Per Farm	$1,264,802
Market Value of Land Per Acre	$1,819
Market Value of Equipment Per Farm	$208,106
Total Cropland (Acres)	91,524
Market Value of All Products Sold	$32,868,000
Market Value of Products Sold Per Farm	$228,251
Market Value of Crops Sold	$32,151,000
Market Value of Livestock Sold	$717,000
Operators with Farm as Principal Occupation	90
Operators with Another Occupation as Principal Occupation	54
Hogs in Inventory	3,300
Hogs Sold	7,160
Beef Cows in Inventory	180
Beef Cows Sold	99
Land in Corn (Acres)	31,059
Land in Soybeans (Acres)	30,013
Land in Cotton (Acres)	22,906
Land in Wheat (Acres)	10,614

Table 8. Commodity production in Hyde County in 2002 and 1997 from the 2002 and 1997 USDA census of agriculture

Commodity	2002 Production	1997 Production	1992-1997 Change
Corn (acres)	31,059	31,990	Decreased 3%
Soybeans (acres)	30,013	36,381	Decreased 17%
Cotton (acres)	22,906	4,212	Increased 444%
Wheat (acres)	10,614	18,989	Decreased 44%
Hog Inventory	3,300	9,890	Decreased 67%
Hogs Sold	7,160	25,059	Decreased 71%
Cattle Inventory	180	427	Decreased 58%
Cattle Sold	99	142	Decreased 30%

OUTDOOR RECREATION IN THE AREA

Fish and wildlife resources have had a profound effect on recreation in the area. Hyde County has always had an abundance of fish and game, due to its diversity of lands and waters. Early in the twentieth century, sportsmen established clubs to protect game and wildlife. Later, as part of a comprehensive wildlife management program, the Service established Swanquarter NWR to conserve and restore habitat for native wildlife and migratory birds. The Service also manages the Mattamuskeet, Pocosin Lakes, and Alligator River NWRs, and the NCWRC manages the Gullrock Game Lands and the Dare County Bombing Range as Game Lands to provide hunting opportunities in the area.

Recreation in the area is also based on the water in the ocean, sounds, bays, rivers, and lakes. Swimming in the ocean and sunbathing on the beach are the anchors of recreation on the Outer Banks of Hyde and Dare counties. Boat ramps provide access to the rivers and sounds. Numerous outfitters provide boats and guided tours. Many vendors sell and rent canoes, kayaks, sailboats, surfboards, and sailboards. There are numerous opportunities to fish in the surf, from piers, in small boats in the sounds and streams, and from large boats in the ocean.

A variety of agencies and organizations provide environmental education and interpretation opportunities: the Service at Alligator River and Pocosin Lakes NWRs, the National Park Service at the Cape Hatteras National Seashore, the State of North Carolina at Pettigrew, Goose Creek, and Jockey's Ridge State Parks and the State Aquarium, the Partnership for the Sounds at the Estuarium in Washington, the town of Manteo at Roanoke Island Festival Park, and the Nature Conservancy at Nags Head Woods.

Many of the festivals in the area are focused on natural resources including Wings over Water throughout the county and Wildfest in Manteo. There is at least one fishing tournament every month from May to November. The Nature Conservancy at Nags Head Woods holds weeklong ecocamps throughout the summer.

Table 9. Economic and population data for northeastern North Carolina counties

County	Average Income[1]	Poverty Rate (%)[1]	Average 2004 Unemployment Rate (%)[2]	2000 Population[1]	Population Trend[1]
N. Carolina	$35,320	12.6	5.5		+21% since 1990
Counties in the Vicinity of Swanquarter National Wildlife Refuge					
Hyde	$23,568	24.8	7.2	5,826	-37% since 1900
Other Northeastern North Carolina Counties					
Beaufort	$28,614	17.4	6.9	44,958	+6% since 1990
Bertie	$22,816	12.6	8.2	19,773	Same as 1990
Camden	$35,423	12.2	3.8	6,885	+16% since 1990
Carteret	$34,348	11.8	4.7	59,383	+13% since 1990
Chowan	$27,900	18.7	4.9	14,526	+7% since 1990
Craven	$33,214	13.8	4.9	91,436	+12% since 1990
Currituck	$36,287	10.8	2.8	18,190	+32% since 1990
Dare	$35,258	8.1	5.1	29,967	+32% since 1990
Gates	$30,087	15.4	4.2	10,516	Same as 1900
Halifax	$24,471	23.6	8.1	57,370	Same as 1950
Hertford	$23,724	23.1	8.0	22,601	Same as 1960
Martin	$26,058	20.1	7.1	25,593	Same as 1940
Northampton	$24,218	23.1	7.3	22,086	Same as 1980
Pamlico	$28,629	16.8	4.7	12,934	+14% since 1990
Pasquotank	$29,305	19.0	4.7	34,897	+11% since 1990
Perquimens	$26,489	19.5	4.8	11,368	Same as 1920
Tyrrell	$21,616	25.7	7.8	4,149	-17% since 1900
Washington	$27,726	20.5	7.3	13,723	Same as 1960

[1] *U.S. Census Bureau, 2000 Census of the United States*

[2] *North Carolina Economic Security Commission, December, 2004*

OUTDOOR RECREATION ECONOMICS

Fish and wildlife are the focus of the refuge, but they are also important to the local economy. First, a considerable commercial fishery is present in area streams, lakes, and sounds. Striped bass, red drum, flounder, speckled trout, and gray trout are the major species harvested. Second, hunting and fishing are economically important to local businesses, both directly as the local population spends money and indirectly as an attraction that draws sportsmen from outside the county.

Unfortunately, water pollution, channel dredging, and wetland clearing and draining have led to the loss of valuable fishery spawning grounds and the loss of habitat for many wildlife species. In the attempt to protect and restore some of these resources, Swanquarter NWR serves an important role, not only by providing habitat for a diversity of plant and wildlife species, but also as a place where people can go to enjoy these resources through wildlife observation, wildlife photography, or more directly through fishing and hunting.

There have been no studies performed on Swanquarter NWR or any other refuges in North Carolina on which to estimate the economic impact of outdoor recreation. The Service has surveyed all wildlife-dependent recreation participants in North Carolina. There has been a study of visitors to the interpretive facilities of a non-governmental organization in northeastern North Carolina. There are also numerous studies of ecotourists and birdwatchers on national wildlife refuges and other areas throughout the United States.

The Service surveyed participants in wildlife dependent recreation in North Carolina in 2001. The survey documented an average expenditure of $69 per day by anglers, $74 per day by hunters, and $199 per day by wildlife observers and photographers. (U.S. Fish and Wildlife Service 2001)

The Partnership for the Sounds sponsored a study of the economic impact of their facilities. The study demonstrated that the average visitor spent $108 per visit, with a range of $63.70 to $332.55 per day (Vogelsong 2001). A similar study of visitors at the Chincoteague National Wildlife Refuge in Virginia also showed a range of expenditures from $62 to $101 per day (U.S. Environmental Protection Agency 1997).

A study commissioned by the State of New Jersey demonstrated that the average visitor to the shorebird migration spent $130 per day (New Jersey Department of Environmental Protection 2000). Birdwatchers on eight national wildlife refuges in New Jersey reported a range of expenditures from $25 to $41 per day (Kerlinger 1994).

Ecotourists on Dauphin Island, Alabama, spent an average of $60 per visitor per day (Kerlinger 1999).

Bird watchers on High Island, Texas, from the local area reported an average expenditure of $46 per day: and non-residents reported $693 per trip (Eubanks, Kerlinger, Payne 1993). The average visitor to the Great Texas Coastal Birding Trail spent $78 per day (Eubanks and Stoll 1999).

Studies at the Santa Ana NWR in south Texas demonstrated a range of expenditures from $88 to $145 per day on nature based tourist activities. The Laguna Atascosa NWR in south Texas reported a range of $83 to $117 per day (U.S. Environmental Protection Agency 1997).

Bird watchers at the Salton Sea NWR in California spent an average of $57 per day (National Audubon Society 1998).

With improved facilities and staffing, Swanquarter NWR can continue to serve as an important commodity in the economic life of the community. Eco-tourism, fishing, wildlife observation and photography, wildlife photography, and environmental interpretation are increasingly being seen as a desirable industry. As the population increases and the number of places left to enjoy wildlife decreases, the refuge may become even more important to the local community. It can benefit the community directly by providing recreational opportunities for the local population, and indirectly by attracting tourists from outside the county to generate additional dollars to the local economy.

TOURISM

Seven million tourists visit the Outer Banks of Dare, Currituck, and Hyde counties every year. Tourism in the area is based on the outdoor recreation opportunities described above and the cultural attractions in the area. Roanoke Island, on which Manteo is located, was the birthplace of Virginia Dare, the first English child born in America. The state legislature named the county in her honor. The county seat in Manteo has a historic district featuring old homes and limited development along the streams and the sound. Manteo also features Roanoke Island Festival Park, with a historic visitor's center and a replica of the Queen Elizabeth II, Elizabethan Gardens managed by the National Park Service as a replica of a formal English garden, and Fort Raleigh National Historic Site, the site of the first settlement.

Other cultural attractions include the National Park Service's Wright Brothers Memorial, Bodie Island Lighthouse, and Cape Hatteras Lighthouse; North Carolina Maritime Museum; the Frisco Native American Museum; and the Chicamocomico Lifesaving Station.

Cultural resources are the basis of many events that attract tourists: historical workshops, lectures, and programs at the North Carolina Maritime Museum; tours of historic homes and their gardens; readings of books on historical themes; Virginia Dare's Birthday, National Aviation Day and Week at the Wright Brothers Memorial; Freedman's Colony Celebration at Festival Park, and an Antique Fair at Festival Park.

Swanquarter NWR and the other nearby refuges serve as additional attractions to tourists visiting the area at least seasonally. If the refuge had more facilities and staffing, tourists might stay longer in the area to enjoy the opportunities provided for wildlife-dependent recreation and interpretation. This could generate more income for the local economy.

TRANSPORTATION

In its early days, residents of the area relied on water transportation. The rivers and streams that crisscross and border the county served as a means for transportation, trade, and communication between almost every community in the area. Some of the important waterways in the area were the Albemarle and Pamlico Sounds and the Alligator River. While today these waterways are no longer necessary for most transportation needs of the county, they are still important as sources of income and for recreation. Ferries still provide access across the sounds. A ferry connects Swan Quarter to the outer banks where millions of tourists spend their vacations.

In the twentieth century, with the popularity of automobiles, state and federal governments developed a network of highways connecting Hyde County to all areas in the eastern United States. U.S Highway 264 runs just south of the refuge and connects population centers in central North Carolina and Interstate 95 to Hyde County. State Route 94 runs north and south from Columbia and Tyrrell County to the refuge and connects Hyde County with U.S Highway 64. A number of smaller roads connect the various communities in the area. In addition, there are international airports in Raleigh, North Carolina, and Norfolk/Virginia Beach, Virginia.

Visitors can reach Swanquarter NWR via U.S. Highway 264.

CULTURAL ENVIRONMENT

Hyde County is a rural county in predominantly rural northeastern North Carolina. Cultural opportunities in the immediate area are limited to the history-based facilities outlined in the tourism section; theater at local high schools and parks; music at local fairs, festivals, and nightclubs; and art at local fairs, festivals, and small art galleries. There has been a summer-long production of "The Lost Colony" annually at the Fort Raleigh National Historic Site commemorating the first English settlers on Roanoke Island in Dare County since 1936. Greenville, North Carolina, and East Carolina University, located 60 miles west of the refuge, offer the nearest opportunities for large theatrical or musical performances. Norfolk, Virginia, located 100 miles to the north, has the area's largest art museums and venues for performing arts with national touring collections and companies.

REFUGE ADMINISTRATION AND MANAGEMENT

LAND PROTECTION AND CONSERVATION

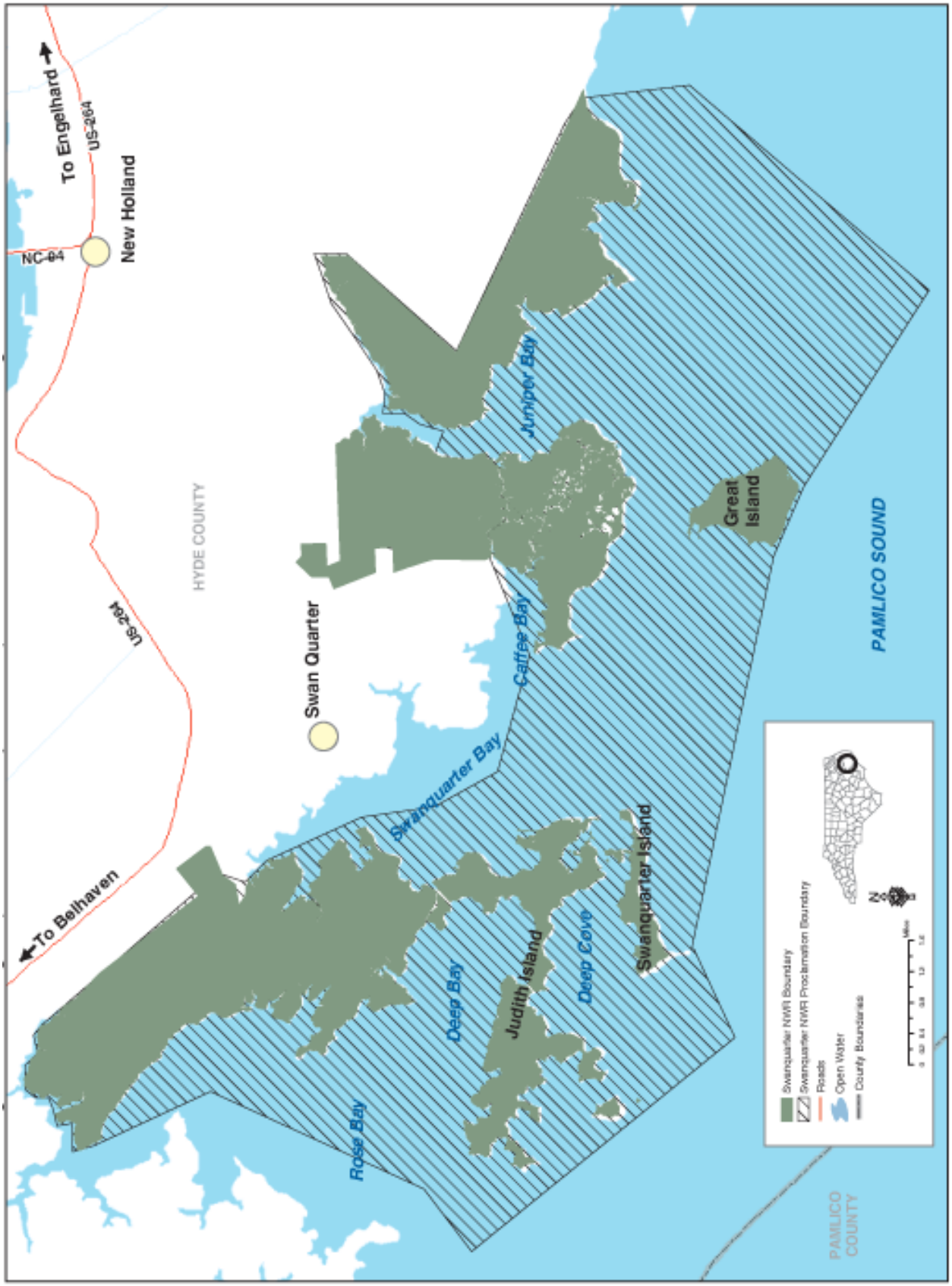
The Swanquarter NWR currently covers 16,411 acres. The approved acquisition boundary is also 16,411 acres (Table 1, Figure 6).

There are many other protected areas in the vicinity of the refuge. The Service manages the 50,180-acre Mattamuskeet NWR, 110,106-acre Pocosin Lakes NWR, and 152,260-acre Alligator River NWR. The NCWRC manages a total of 88,217 acres in Tyrrell, Hyde, Dare, and Washington counties: 31,057-acre Gull Rock Game Land, 41,200 acres of the Dare County Bombing Range as Game Lands, 617-acre Scuppernong Game Land, 1,825-acre Lantern Acres Game Land, 614-acre Pungo River Game Land, 5,426-acre Bachelor Bay Game Land, 5,482-acre Van Swamp Game Land, 600-acre J. Morgan Futch Game Land, and 1,394-acre New Lake Game Land.

The North Carolina Division of Parks and Recreation manages the Pettigrew State Park (1,273 acres of land and 16,600 acres of water on Lake Phelps) in Washington County, the 1,665-acre Goose Creek State Park in Washington, and the 426-acre Jockey's Ridge State Park in Dare County. The North Carolina Division of Coastal Management protects the 18,000-acre Buckridge Coastal Reserve in southeastern Tyrrell County.

The Conservation Fund owns the 9,700-acre Palmetto Peartree Preserve in northeastern Tyrrell County. The Nature Conservancy protects the 653-acre Scuppernong River Preserve in northwestern Tyrrell County.

Figure 6. Current boundary of the Swanquarter NWR



EDUCATION AND VISITOR SERVICES

The refuge is an important link to the other natural areas that together make outdoor recreation experiences possible. Carefully selected and managed staff, programs, and facilities will provide the wildlife-dependent environmental education, interpretation, and recreation opportunities the refuge's visitors expect. A few commercial businesses have interests in guiding canoeing and kayaking tours and angling adventures.

Hunting

The Service allows waterfowl hunting on a portion of the refuge. The best access for hunting is from the Pamlico Sound by boat. Refuge hunting regulations are in keeping with the management objectives to ensure the activity continues at a level compatible with achievement of maintaining optimum populations of hunted species and other species that may be impacted by the hunt. For refuge hunts, a State license is required, and all State regulations apply.

Fishing

Swanquarter NWR offers fishing in Pamlico Sound from the Bell Island Pier and the adjacent waterbodies from March 1 to October 1. Spotted sea trout, redfish (puppy drum), and flounder are the most commonly sought species. State regulations apply; a State Fishing license is required for refuge fishing in most cases.

Environmental Education

Swanquarter NWR does not currently offer planned education programs. The staff does conduct programs when teachers request them if staff is available. University professors utilize the refuge as an outdoor classroom and research site. There are currently no visitor center or education facilities at Swanquarter NWR. The administrative office for Swanquarter NWR is on the Mattamuskeet NWR next to Mattamuskeet Lodge and has literature about the refuge.

The refuge participates actively in an intern program, affording more specific environmental education opportunities to college students. The bookstores at Mattamuskeet and Pea Island NWRs on the Outer Banks of Dare County offer numerous books on the wildlife specific to Swanquarter NWR.

Interpretation

Swanquarter NWR does not currently offer interpretive programs at the refuge. At the request of teachers or other community leaders, the staff, if available, will conduct activities or talks to convey messages related to the refuge wildlife and natural resources. In the past, a Swanquarter NWR brochure was made available to the public at the administrative office located on Mattamuskeet NWR.

Wildlife Observation

Opportunities are available to observe waterfowl and wading birds in Pamlico Sound, estuaries, and refuge ditches along the gravel road to the Bell Island Pier. Boating, canoeing, and kayaking opportunities are available for unique wildlife observation opportunities. The black bear population in Hyde County is one of the largest in northeastern North Carolina, and many visitors find it quite easy to get a glimpse of a bear in the wild. More fortunate visitors observe a red wolf, an alligator, or a bald eagle; however, these observations are usually a result of just being in the right place at the right time. While birdwatching is not a major attraction here, there is a wide variety of songbirds on the

refuge, and there is ample opportunity to view reptiles and small mammals. A number of plant species, terrestrial and hydrophytic, as well as the mature loblolly pine trees with an understory of saltmeadow cordgrass, are also readily observed.

Wildlife Photography

The waterbird and mammalian populations of Swanquarter NWR, together with the gravel roads and Bell Island Pier, offer unlimited opportunities for landside wildlife photography. Canoe and kayak trips on the Pamlico Sound and through backwaters of the refuge offer waterfront photographic opportunities. But, as is true with wildlife photography in most places, a great deal of patience and perseverance is needed to accomplish professional quality shots.

Public Involvement

The refuge offers volunteer opportunities for the general public, as well as organizations. These opportunities may include conducting wildlife surveys, leading wildlife tours, or presenting programs at area schools. Volunteers also often share their experiences with refuge visitors who may otherwise have little knowledge of the protection and management efforts conducted by volunteers and refuge staff to benefit wildlife.

The intern program, while providing unique experiences for college students and graduates geared towards careers in environmental sciences, also provides additional volunteer service to maintain the high standards of the refuge. This program instills a sense of pride and public stewardship among the volunteers, ensures them of their role in ownership of the land, and heightens awareness about the critical need for protection of the human/natural interactions.

PERSONNEL, OPERATIONS, AND MAINTENANCE

The three national wildlife refuges--Mattamuskeet, Swanquarter, and Cedar Island were combined and are managed as one complex by the Service. Today, refuge staff administers Mattamuskeet, Swanquarter, and Cedar Island NWRs from an office located at the Mattamuskeet NWR in south-central Hyde County. The current refuge staff is identified in Table 10.

Refuge Infrastructure

There is very little infrastructure at the Swanquarter NWR. More than half the refuge is a wilderness area. One road provides access to the refuge from U.S. Highway 264 to the Bell Island Pier. A spur road extends from the entry road east approximately 2 miles. Currently there is one portable restroom located at the Bell Island Pier parking lot for public use. All former refuge administration buildings have been removed.

Table 10. Staff of Mattamuskeet, Swanquarter, and Cedar Island NWRs - 2007

Position	Status	Percent of Time on Mattamuskeet	Percent of Time on Swanquarter	Percent of Time on Cedar Island
Refuge Manager, GS-0485-13	PFT	85	5	10
Assistant Manager, GS-0485-12	PFT	85	5	10
Park Ranger (Law Enforcement), GS-0025-09	PFT	90	10	0
Office Assistant, GS-0303-09	PFT	100	0	0
Heavy Mobile Equipment Operator, WG-5803-10	PFT	100	0	0
Crane Operator, WG-5725-10	PFT	100	0	0
Maintenance Worker, WG-4749-08	PFT	95	5	0
Maintenance Worker, WG-4749-08	PFT	0	0	100
Forestry Technician, GS-0462-05 (Fire)	PFT	90	10	0

PFT = permanent full time, Fire = funded by fire budget

III. Plan Development

SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

The planning team identified a number of issues, concerns, and opportunities related to fish and wildlife protection, habitat restoration, and management of threatened and endangered species. Additionally, the planning team considered federal and state mandates, as well as applicable local ordinances, regulations, and plans. The team also directed the process of obtaining additional input by compiling a mailing list of likely interested government agencies, non-governmental agencies, businesses, and individual citizens. The Service invited these agencies, organizations, businesses, and citizens to participate in six public scoping meetings held on February 15, 16, 20, 22, and 23, 2001 in Washington, Plymouth, Columbia, Swanquarter, and Manns Harbor, North Carolina. The planning team introduced the audience to the refuge and its planning process and asked them to identify their issues and concerns. The Service published announcements giving the location, date, and time for the public meeting in the *Federal Register*, and legal notices in local newspapers. The team also sent news releases to local newspapers and public service announcements to television and radio stations. Service personnel placed fifty posters announcing the meeting in local post offices, local government buildings, and stores.

The Service expanded the planning team's identified issues and concerns to include those generated by the agencies, organizations, businesses, and citizens from the local community. These issues and concerns formed the basis for the development and comparison of the different alternatives described in the EA. A summary of the public scoping comments and the Service responses are provided in Appendix D.

All public and advisory team comments were considered; however, some issues important to the public fall outside the scope of the decision to be made within this planning process. The team considered all issues that were raised throughout the planning process, and has developed a plan that attempts to balance the competing opinions regarding important issues. The team identified those issues that, in the team's best professional judgment, are most significant to the refuge. A summary of the significant issues follows.

FISH AND WILDLIFE POPULATION MANAGEMENT

Threatened and Endangered Species

Recovery and protection of threatened and endangered plants and animals are important responsibilities delegated to the Service and its national wildlife refuges. Three threatened or endangered animals use, or could use, Swanquarter NWR: the red-cockaded woodpecker, red wolf, and American alligator.

Red-cockaded woodpeckers nest in pines on the southern part of the Alligator River NWR, 30 miles east of the Swanquarter NWR, and the northeastern corner of the Pocosin Lakes NWR, 30 miles north of the Swanquarter NWR. A breeding population also occurs on the adjacent 25,318-acre Gull Rock Gameland Area, which borders the east side of the refuge. Adequate pine habitat does exist on the Swanquarter NWR; however, no aerial surveys have been conducted to determine the presence of a population. To provide optimal habitat for the red-cockaded woodpeckers at the Swanquarter NWR would require active management of the mixed pine/hardwood forest.

The Service introduced red wolves to the area in 1987. The first animals were captive-bred animals that were offspring of the last wild red wolves in existence. The total population on the Albemarle-Pamlico Peninsula is approximately 100 adults. Breeding pairs of red wolves occur on the adjacent Gull Rock Gamelands area but not on Swanquarter NWR; however, portions of the refuge are used by red wolves for hunting. There is a disparity in public attitudes and opinions toward the red wolves. Some local residents resent the Federal Government for introducing a predator to the area. Other residents appreciate the value of the red wolves in nature.

American alligators are listed as threatened due to their similarity of appearance to crocodiles. Alligators do live and reproduce in the area in small numbers; however, their exact population is uncertain. They rely on marshes with healthy vegetation to survive. The careful management of refuge lands and other private and public lands adjacent to the refuge is very important to the persistence of that vegetation.

Waterfowl

The management of the refuge marshes and the open water of the Pamlico Sound (within the Proclamation Boundary) for waterfowl is important for meeting the refuge's purposes. Habitat loss and fragmentation negatively affect waterfowl. In addition, increased turbidity in open waters is negatively impacting submerged aquatic vegetation upon which waterfowl feed. The refuge must maintain the marshes and open water to meet waterfowl habitat needs, including sufficient sanctuary areas that provide undisturbed resting and feeding areas. In doing so, the refuge supports waterfowl populations, which, in turn, provide hunting and wildlife observation opportunities. Providing undisturbed waterfowl sanctuaries and hunting opportunities are both important goals which must be carefully balanced to meet the needs of waterfowl, as well as hunters.

Neotropical Migratory Birds

Neotropical migratory birds, which are predominantly songbirds, are a species group of special management concern. Swanquarter NWR was created in accordance with the Migratory Bird Conservation Act of 1929. Habitat loss and fragmentation, along with associated predation, have negatively impacted neotropical migratory bird populations. Providing habitat (i.e., pocosins, hardwood forests, pine forests, and brackish marshes) for these birds is essential to fulfilling the refuge's purpose. Strategic forest and marsh habitat management, compatible with the refuge's waterfowl habitat objectives, would contribute to the habitat needs of neotropical migratory birds, and provide observation opportunities for birders.

Nuisance Species

Invasive and exotic organisms which occur on the refuge include common reed (*Phragmites australis*), nutria (*Myocaster coypus*), and fire ants (*Solenopsis invicta*). Refuge personnel monitor the impact of these exotic species and determine control options as necessary. Compared to many southeastern refuges, Swanquarter NWR is relatively intact with native vegetation and vertebrates. Non-native species currently occur at relatively low levels and control actions are therefore minimal.

HABITAT MANAGEMENT

Global Warming and Sea Level Rise

The entire refuge is within a few feet of sea level. Marshes and forests cover the majority of the refuge. Scientists predict that the sea level along the North Carolina coast will rise from 2 to 3 feet in

the next 100 years due to global warming. The Sea Level Affecting Marsh Model (SLAMM) predicts that by 2025 the sea level at Swanquarter NWR will rise between a minimum of 0.11 meters to a possible maximum of 0.21 meters; by 2050 it will rise between a minimum of 0.20 meters and a maximum of 0.42 meters; and by 2100 it will rise between a minimum of 0.37 meters and a maximum of 0.94 meters. SLAMM projects the amount of dry land on the refuge would decrease and possibly be eliminated, and total acres of transitional salt marsh, tidal flats, and estuarine open water would increase. That rise in water levels has initiated change and will continue to change the types of vegetative cover on the refuge. Grass-dominated brackish and freshwater marshes will expand into areas currently covered by loblolly and pond pine forests.

As the habitats change, the wildlife species that inhabit those habitats will also change. Some species of waterfowl, songbirds, and mammals will lose access to cavities as trees decay and fall. Freshwater marshes will expand into former loblolly and pond pine forests and provide new marsh habitat for species of songbirds and waterfowl which are being displaced by the loss of marsh habitat adjacent to Pamlico Sound. The Service will be studying global warming and sea level rise to develop a system-wide strategy for management.

Brackish Marsh

Much of the natural brackish marshes in the region had a natural fire frequency of 1 to 3 years but has endured fire exclusion over the past half century or longer. Without prescribed fire, the marshes suffer from a lack of species diversity allowing only one to three species to dominate. The marshes at Swanquarter NWR are adjacent to Pamlico Sound; therefore large mats of thatch and storm debris drift up in long wide tide lines (storm rack), suffocating large strips of marsh. Dead grass makes up a large component of the remaining marsh stands, limiting plant productivity and nutrient availability and adversely affecting wildlife habitat. However, some species do benefit by the presence of storm rack. Forester's terns nest exclusively on storm rack and would not breed in the Pamlico Sound region without it.

Forests

The forest lands at Swanquarter NWR support, or have the potential to support, the red-cockaded woodpecker, migrating songbirds, and other indigenous wildlife such as the white-tailed deer. These habitats must be managed to maintain diversity of plant species, and to maintain the characteristics required by the wildlife that inhabits, or could inhabit, these forests. Management practices that could be used include prescribed fire, thinning, and timber harvesting.

Open Water

Increased turbidity in open waters is an issue. Suspended solids and other solids cloud the water, blocking sunlight from submerged aquatic vegetation (SAV). Excessive amounts of sediment may cover the plants completely. There is widespread recognition by the Service, state agencies, non-governmental organizations, and the general public that SAV is on the decline in the region. SAV, a habitat itself, provides food and shelter for diverse communities of waterfowl, fish, shellfish, and invertebrates. The regional SAV decline has resulted in corresponding declines in migrating diving duck populations and fish nursery productivity. Like all green plants, SAV produces oxygen, which is important to the open water habitat. SAV also filters and traps sediment, which can bury bottom dwelling organisms like oysters. Currently, there is no water quality monitoring or monitoring of SAV at the Swanquarter NWR.

RESOURCE PROTECTION

Cultural Resources

There have been limited archaeological investigations within the refuge. The staff must conduct all management activities in a manner that avoids compromising sensitive sites.

Law Enforcement and Refuge Regulation

The refuge enforces applicable laws and regulations through the use of one full-time law enforcement officer shared with Mattamuskeet, Pocosin Lakes, and Cedar Island NWRs and headquartered at Mattamuskeet NWR. The combined areas total nearly 200,000 acres and require drives of as much as 4 hours between some areas. The extensive size of the territory greatly limits the amount of actual law enforcement conducted. There are concerns that illegal hunting activities at Swanquarter NWR are not being addressed adequately.

VISITOR SERVICES

The Improvement Act established six priority wildlife-dependent public uses that are allowed on refuge lands when they are compatible and desirable for that specific refuge and its purposes. These priority public uses are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. Swanquarter NWR could support the priority public uses. Wildlife observation and wildlife photography attract thousands of visitors to Swanquarter NWR annually. The refuge's Bell Island Pier provides fishing access to the Pamlico Sound. The Service permits hunting for waterfowl on 6,120 acres of marsh on the eastern side of the refuge during state hunting seasons. The refuge does not allow waterfowl hunting within the Proclamation Boundary of the Pamlico Sound or in other areas of the refuge. Currently, no educational or interpretive activities are conducted at the refuge. Accessing the refuge by motor vehicle, bicycle, and boat is an important issue in the public use program.

Hunting and Fishing

Currently, the Service permits hunting for waterfowl on Swanquarter NWR. An average of 400 hunters participates annually. The Service provides opportunities for approximately 50,000 angler-use days annually. People can fish from Bell Island Pier, from the shoreline, and from boats. Hunting and fishing are integral parts of rural North Carolina culture. It is not surprising that there is considerable state and local interest in providing additional hunting opportunities, especially for black bear, which is hunted on private lands surrounding the refuge. Any expanded hunting and fishing opportunities will be dependent upon providing safe, quality experiences that are compatible with refuge purposes.

Environmental Education and Interpretation

The refuge does not conduct planned public tours, educational programs, or interpretive programs. Local residents expressed interest in the refuge providing ecotourism opportunities, creating new public use programs, improving signage, and incorporating local culture and heritage of the area into refuge programs.

REFUGE ADMINISTRATION

Staffing and Facilities

The staff headquartered at the Mattamuskeet NWR manages Swanquarter NWR. The lack of staff at Mattamuskeet NWR and assigned specifically to Swanquarter NWR and the lack of facilities have prevented the refuge from realizing its full potential. The refuge conducts too few wildlife inventories; has incomplete habitat/wildlife management plans; has few public use programs and facilities; and is not able to provide environmental education, interpretation, or wildlife observation opportunities. Comments received at the public scoping meetings suggested the refuge utilize volunteers for "refuge workdays," manpower and maintenance, or other needs.

WILDERNESS REVIEW

Refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process. The Wilderness Act of 1964 defines a wilderness area as an area of federal land that retains its primeval character and influence, without permanent improvements or human inhabitation, and is managed so as to conserve its natural conditions and which:

- Generally appears to have been influenced primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- Has outstanding opportunities for solitude or primitive and unconfined types of recreation;
- Has at least 5,000 contiguous roadless acres or is of sufficient size to make practicable its preservation and use in an unimpeded condition; or is a roadless island, regardless of size.
- Does not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or its wilderness character could be restored through appropriate management at the time of review; and
- May contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

Approximately 8,800 acres of Swanquarter NWR are part of the National Wilderness Preservation System. The Swanquarter Wilderness Area comprises about 54 percent of the total refuge. The remaining refuge lands total approximately 7,600 acres. However, these lands are not contiguous, and the largest tract contains the only two roads on the refuge, one of which provides access to the Bell Island Pier. Therefore, no additional lands meet the conditions to consider them possible wilderness areas.

IV. Management Direction

INTRODUCTION

The Service manages fish and wildlife habitats, considering the needs of all resources in decision-making. But first and foremost, fish and wildlife conservation assumes priority in refuge management. A requirement of the Improvement Act is for the Service to maintain the ecological health, diversity, and integrity of refuges. Public uses are allowed if they are appropriate and compatible with wildlife and habitat conservation. The Service has identified six priority wildlife-dependent public uses. These uses are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

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

Three alternatives for managing the refuge were considered: Alternatives A – Current Management – No Action; B – Moderately Expanded Program; and C – Optimally Expand Programs. Each of these alternatives is described in the EA. The Service chose Alternative B – Moderately Expanded Programs – as the proposed management direction.

Implementing the proposed alternative would result in enhanced wildlife populations and related habitats over the next 15 years. It also provides visitors with more opportunities to enjoy wildlife-based recreation.

The refuge was established under the authority of the Migratory Bird Conservation Act, therefore the plan focuses on providing quality habitat for migrating birds, as well as threatened and endangered species, particularly the red-cockaded woodpecker, the red wolf, and the American alligator, as well as other waterfowl and fish. The need for extensive inventorying and monitoring for baseline data is recognized.

One of the primary objectives of the proposed plan is to improve the visitors' access and experience. The plan provides greater opportunities for hunting and fishing by increasing the number of hunting and angler use days, and introducing bow hunting for white-tailed deer. Wildlife observation and wildlife photography opportunities would be enhanced by the development of a trail or boardwalk within 10 years of CCP approval, by providing a wildlife list for the refuge, and by making wildlife information accessible to visitors. Environmental education and interpretation would also be a focus area for the refuge.

Refuge staff, partners, and volunteers in cooperation would provide the services required to protect and manage the refuge for the fish and wildlife resources, and for the use and enjoyment of the American people.

VISION

Swanquarter NWR functions as a vital part of the National Wildlife Refuge System as an important wintering area for migratory birds, such as ducks, geese, and swans, on the Atlantic flyway. The refuge maintains breeding habitat for a variety of migratory birds. The refuge protects and enhances a healthy brackish marsh ecosystem and an upland forest ecosystem, and maintains the natural and

primitive character of the large wilderness area. The refuge provides habitat for threatened and endangered animals, particularly the red-cockaded woodpecker, red wolf, and American alligator.

Visitors enjoy quality recreation opportunities for fishing by boat or from the Bell Island pier, crabbing, waterfowl and deer hunting, wildlife observation, and wildlife photography. Visitors understand and appreciate the significance of the north Pamlico Sound ecosystems and the importance of refuge management activities.

The refuge staff works with partners and volunteers to achieve the refuge's goals. Essential scientific information is garnered through research conducted at Swanquarter NWR in cooperation with government agencies, non-governmental agencies, universities, and others.

GOALS, OBJECTIVES, AND STRATEGIES

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

These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the Improvement Act, the mission of the National Wildlife Refuge System, and the purposes and vision of Swanquarter NWR. The Service intends to accomplish these goals, objectives, and strategies within the next 15 years.

FISH AND WILDLIFE POPULATION MANAGEMENT

Goal

Conserve, enhance, and maintain healthy populations of migratory birds, wildlife, fish, and plants, including federal and state threatened and endangered species.

Objective

Within one to five years after reaching minimum staffing levels, conduct baseline surveys of birds, mammals, fish, reptiles, and amphibians to document species composition and population parameters, and conduct routine monitoring of wildlife.

Discussion*:*

Wildlife populations need to be adequately surveyed and monitored to determine if species exist on the refuge, to establish population trends, to identify management needs, and to evaluate the impact of management actions. If routine monitoring is not conducted, refuge staff would not be able to detect subtle changes in species or populations, which should trigger management changes. Monitoring after prescribed burns is essential to understanding the effects of the burn on the biota, such as determining the impacts or multiple ignition points on "secret birds" or determining if the burn helps enhance vegetative diversity.

Strategies:

- Assist cooperating agencies and universities in conducting baseline surveys and other studies of water birds, other birds, fish, and other wildlife.
- Document population densities of waterfowl, marsh birds, wading birds, and colonial nesting birds annually.
- Conduct annual bimonthly aerial surveys and weekly ground surveys of waterfowl during the migration period (November-February).
- Conduct midwinter waterfowl survey.
- Conduct annual brood surveys of American black duck.
- Annually monitor and investigate mortality of waterfowl from disease.
- Support special banding programs as directed by the Service.
- Conduct breeding season callback surveys of marsh birds every ten days along suitable habitat.
- Conduct annual nesting and recruitment survey of wading and colonial nesting birds.
- Conduct annual surveys to document the presence of threatened and endangered species.
- Cooperate with the Red Wolf Recovery Program.
- Work with volunteers to establish and conduct Christmas bird counts.
- Conduct herd health checks on white-tailed deer every five years in cooperation with Southeastern Wildlife Disease Study Group.
- Cooperate with State and Federal agencies to monitor and manage disease in wildlife as requested.
- Monitor wildlife in conjunction with other activities, and initiate investigations as needed.
- Staff and public note unusual wildlife observations.
- Monitor the biotic community response to prescribed fire, and adjust Fire Management Plan as needed.
- Evaluate the impacts of management activities on wildlife and adapt management as needed.

HABITAT MANAGEMENT

Goal

Protect and enhance diverse habitats, rare plant assemblages, and nursery areas associated with the Pamlico-Core Sounds and the mid-Atlantic coastal plain.

Discussion*:*

Providing quality habitat for migrating birds, threatened and endangered species, fish and other wildlife is one of the purposes of the refuge. Animals need areas for nesting, resting, breeding, hunting, and feeding, and different species require different types of healthy habitat. Habitat loss and fragmentation negatively affect fish and wildlife.

Objective

Throughout the 15-year life of the CCP, actively manage and maintain quality habitat for threatened and endangered species that could and/or do utilize the refuge.

Discussion*:*

By providing quality habitat for threatened and endangered species the Service would promote increased populations of these species. The red-cockaded woodpecker requires healthy stands of mixed pine hardwood forest, the American alligator requires healthy marsh habitat, and the red wolf needs adequate hunting grounds.

Strategies:

- Conduct prescribed burning in accordance with the Fire Management Plan, being mindful that Forester's tern nest exclusively on storm rack along the perimeter of marsh areas.
- Conduct thinning, timber harvesting of forests as needed.
- Monitor and control nuisance and invasive species as needed by use of approved chemicals, by physical removal, or by prescribed burning.
- Conduct surveys to determine the distribution of sensitive joint vetch, and/or suitable habitat for sensitive joint vetch on the refuge.

Objective

Throughout the 15-year life of the CCP, actively manage and maintain quality habitat for neotropical migratory birds (songbirds).

Discussion:

Neotropical migratory birds utilize pocosins, hardwood forests, pine forests, and brackish marshes on the refuge. Providing habitat for these birds is in adherence with one of the refuge's purposes. Healthy populations of songbirds at the refuge provide visitors with good observation opportunities.

Strategies:

- Conduct prescribed burning in accordance with the Fire Management Plan, being mindful that Forester's tern nest exclusively on storm rack along the perimeter of marsh areas.
- Conduct thinning, timber harvesting of forests as needed.
- Monitor and control nuisance and invasive species as needed by use of approved chemicals, by physical removal processes, or by prescribed burning.

Objective

Throughout the 15-year life of the CCP, actively manage and maintain quality habitat for waterfowl and fish.

Discussion:

Waterfowl utilize the marshes and open water areas of the refuge. Submerged aquatic vegetation in the open water provides food and shelter for diverse communities of waterfowl, fish, shellfish, and invertebrates. Providing for waterfowl and fish is one of the refuge's purposes which must be balanced with providing opportunities for hunters and fishermen.

Strategies:

- Conduct prescribed burning in accordance with the Fire Management Plan, being mindful that Forester's tern nest exclusively on storm rack along the perimeter of marsh areas.
- Cooperate with other agencies to identify and control erosion and sedimentation in and around the refuge to protect SAV.
- Monitor and control nuisance and invasive species as needed by use of approved chemicals, by physical removal processes, or by prescribed burning.
- Use only approved herbicides in accordance with label instructions when needed.
- Support water quality monitoring conducted by university and state agencies.
- Develop and implement a water quality and SAV monitoring plan within three years of reaching minimum staffing levels.
- Check, maintain, and clean wood duck boxes as needed.

Objective

Throughout the 15-year life of the CCP, maintain the health, integrity, and natural condition of the 8,800 acre wilderness area by use of proper management.

Discussion:

Wilderness areas provide "outstanding opportunities for solitude or a primitive and unconfined type of recreation." It is an area of "undeveloped Federal land retaining its primeval character and influence, without permanent improvement or human habitation." "It generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable" (Wilderness Act of 1964). Management of the wilderness area takes a somewhat hands-off approach.

Strategies:

- Inventory wilderness ecosystems to collect baseline data. Identify indicators and develop monitoring standards for those elements critical to ecological integrity. Provide feedback for adaptive management.
- Conduct prescribed burning, where necessary, to mimic the natural fire cycle.
- Monitor air quality by operation of IMPROVE site weekly.
- Implement integrated exotic plant and animal management to include prevention, detection, quick elimination of spot infestations, and control of major occurrences, as needed.

Objective

Protect ecologically important land and resources on and near the refuge throughout the 15-year life of the CCP.

Strategies

- Protect existing refuge lands and purchase adjacent lands that are clearly beneficial to wildlife. (Purchased property acreage would total less than 10 percent of the existing refuge lands and would be purchased from willing landowners.)
- Survey and post boundaries as needed.
- Identify and pursue funding to purchase key properties to add to the refuge.

- Assist adjacent landowners to prevent spread of noxious weeds onto the refuge.
- Identify and monitor non-native pest animals (e.g., nutria, fire ants) that conflict with refuge objectives annually.
- Develop and implement a Noxious Animal Management Plan within 5 years of reaching minimum staffing levels.
- Cooperate with the State Health Department to monitor for mosquito born diseases.

RESOURCE PROTECTION

Goal

Protect archaeological, cultural, and historic resources for future generations as examples of human interaction with the natural environment.

Discussion:

There are no known cultural resources on Swanquarter NWR. However, there may be resources unseen that could be disturbed by construction or land disturbance.

Objective

Integrate cultural resource preservation into refuge programs, operations, and management plans to protect cultural resources in perpetuity.

Strategies:

- Prior to any non-emergency, ground-disturbing activity, the refuge will complete the "Request for Cultural Review Compliance" form and forward it to the Regional Archaeologist for review.
- If cultural resources are discovered in an area, all efforts will be made to protect them (i.e., halting heavy equipment operation in the vicinity, and otherwise not further disturbing the site).
- When step-down plans (e.g., fire management, road maintenance, safety, and emergency response) are written or rewritten for all refuge programs, a section addressing cultural resource management will be included.
- Within 15-year life of the CCP, prepare and begin to implement a Cultural Resources Management Plan.

VISITOR SERVICES

Goal

Develop programs and facilities to increase public use opportunities, including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation, on the Swanquarter NWR.

Objective

Within five years of CCP approval, provide annual opportunities for public hunting use days as follows: waterfowl – 400-use-days; white-tailed deer – 100-use-days.

Discussion:

This CCP improves on the current management by increasing the level of waterfowl hunting and initiating a deer hunting program with archery equipment.

Strategies:

- Provide waterfowl hunting opportunities in hunts on 6,000 acres for about 400 hunter days annually.
- Provide opportunities for deer hunting with archery equipment for about 100 hunter days on the upland portions of the refuge within five years.
- Cooperate with the NCWRC on enforcement of hunting regulations on a continuous basis.
- Allow use of guides for waterfowl hunting and closely control guiding program through the use of special use permits.

Objective

Within five years of CCP approval, provide fishing opportunities from the Bell Island Pier and from the shorelines of the entire refuge for 55,000-angler-use-days, twelve months each year.

Discussion:

This plan improves on the current management by increasing the level of angler use.

Strategies:

- Provide access for disabled anglers on the Bell Island Pier.
- Cooperate with the NCWRC on enforcement of fishing and boating regulations on a continuous basis.
- Increase the availability of refuge website information which is useful to fishermen including maps, hazards, species information, and links to tide and nautical charts.

Objective

Throughout the 15-year life of the CCP, facilitate wildlife observation and photography opportunities by maintaining the facilities and/or developing new facilities and tools for the public.

Discussion:

The possibility of sighting songbirds, other migrating birds, pelicans, white-tailed deer, and other resident wildlife is an attribute of Swanquarter NWR. Currently, the entrance road, a spur road, and the Bell Island Pier are the featured areas for wildlife observation and wildlife photography. Enhancing the facilities would provide more opportunities for sightings and improve the visitor experience at the refuge.

Strategies:

- Provide maintenance on the Bell Island Pier on an annual basis, or as needed.
- Develop and maintain one interpretive trail or boardwalk within ten years after CCP approval.
- Provide a wildlife list for Swanquarter NWR.

- Evaluate special access under permitted conditions to commercial and educational photographers.

Objective

Throughout the 15-year life of the CCP, review and evaluate proposed activities, including non-wildlife dependent public uses, on an annual basis.

Discussion:

The refuge is currently under-utilized with respect to public use activities. Allowing commercial ecotours, for instance, is a viable option to provide public use opportunities and give the refuge visibility. However, there have been limited inquiries about ecotourism in the past.

Strategies:

- Review and evaluate proposed activities on a case-by-case basis.
- Conduct appropriate use and compatibility determinations on proposed uses.
- Review, develop conditions for, and monitor compliance for up to ten special use permits annually.

Objective

Increase environmental education and interpretive opportunities for the public. The material presented would include information regarding the importance of marsh habitat and upland forest habitat to migrating birds, threatened and endangered species, and other resident wildlife; the value of the red wolves in nature; the refuge's role in protecting, managing, and conserving the habitat and wildlife; and the value of the wilderness area. Programs could incorporate elements of local heritage and culture.

Discussion:

The refuge currently conducts environmental education or environmental interpretation programs upon request when able. To better appreciate the refuge and the work the Service does, visitors need to understand the importance of the refuge and the critical role the Service has in its management. Disparate and negative attitudes and opinions regarding the introduction of red wolves to the area could be alleviated through education. Introducing local heritage and cultural information into the programs could increase awareness and interest in the refuge.

Strategies:

- Conduct two to ten programs for local school groups annually, or as requested.
- Host university students who are performing research on a continual basis.
- Develop and maintain one interpretive trail or boardwalk within 10 years of CCP approval.
- Update and revise the Swanquarter NWR brochure, and make it available within one to three years of CCP approval.
- Maintain a kiosk at Swanquarter NWR and/or a visitor contact station at Mattamuskeet NWR with wildlife exhibits and information related to Swanquarter NWR within five years of CCP approval.

Objective

Increase outreach efforts and implement an outreach program within five years of reaching the minimum staffing level.

Discussion:

The refuge's current outreach efforts are very limited. The Service proposes to actively increase outreach efforts to make the public aware of the wildlife, habitat, refuge management, and public use opportunities on the refuge.

Strategies:

- Develop news releases for major events (e.g., National Wildlife Refuge Week, National Fishing Day, and International Migratory Bird Day) throughout the year.
- Conduct one program annually to celebrate National Wildlife Refuge Week, National Fishing Week, or International Migratory Bird Day.
- Serve as host to and assist with a "Nature Week," sponsored by the Hyde County Extension Service, or serve as host to and assist with an "Environmental Field Day," sponsored by the Hyde County Soil and Water Conservation District, annually.
- Maintain an internet website for the refuge and update annually.
- Develop a news release at least quarterly to announce activities and regulations on the refuge.
- Organize and conduct a "Refuge Workday" enlisting volunteer support annually.

REFUGE ADMINISTRATION

Goal

Provide administrative support and resources to ensure that the goals and objectives for refuge habitats, fish and wildlife species and populations, and public use are achieved.

Discussion:

Refuges must have appropriate staff, facilities, equipment, and resources to accomplish their goals and objectives. Keeping equipment and facilities in good condition is critical to meeting refuge goals and objectives.

Objective

Within the 15-year life of the CCP, provide a full complement of 13 full-time, well-trained staff assigned to Mattamuskeet NWR Complex and make available to share with Swanquarter and Cedar Island NWRs.

Discussion:

Currently, nine full-time staff members are assigned to the Mattamuskeet NWR Complex, who spend 0.5 full-time equivalent (FTE) on Swanquarter NWR.

Strategies:

- Staff the complex with one manager, two assistant managers, one wildlife biologist, one administrative office assistant, two park rangers (one law enforcement, one public use), one heavy equipment mechanic, one heavy equipment operator, three maintenance workers (one dedicated to Cedar Island), and one forestry technician (firefighter).
- Share 1.5 FTEs from the Refuge Complex Office with Swanquarter NWR.
- Provide the staff with professional, technical, and leadership development training opportunities.
- Recognize employee performance through the employee incentive program.

Objective

Ensure public safety and protect refuge resources by encouraging voluntary compliance and enforcing refuge regulations as needed.

Discussion:

One full-time law enforcement officer is shared with Mattamuskeet, Pocosin Lakes, and Cedar Island NWRs and is headquartered at Mattamuskeet NWR. There are concerns that illegal hunting and/or fishing activities at Swanquarter NWR are not being addressed adequately. Protecting the natural resources of the refuge and ensuring the safety of refuge visitors are fundamental responsibilities of the National Wildlife Refuge System.

Strategies:

- Erect signage and/or make information available to make refuge visitors aware of refuge regulations and safety precautions within two years after CCP approval.
- Eliminate hazards and/or control access to hazardous areas as needed.
- Conduct routine patrols to maintain a law enforcement presence on the refuge once minimum staffing levels are met.
- Coordinate with local, county, and state law enforcement agencies to facilitate cooperation and assistance in law enforcement activities on a regular basis.
- Prosecute 10-50 violations annually.
- Monitor activities on land adjacent to the refuge with respect to threatened and endangered species and migratory birds once minimum staffing levels are met.

Objective

Implement new refuge programs and activities or enhance current programs and activities by coordinating with other local, state, federal, public, and private agencies within five years of CCP approval.

Discussion:

The small staff at Mattamuskeet NWR (each of whom spends only 10 percent or less of their time working on Swanquarter NWR) has lacked the manpower and resources to develop and conduct recommended activities and programs. Sound fire management on the refuge and adjacent land and bird surveys rely on the refuge's cooperation with other agencies and organizations. By partnering with agencies and organizations, more activities and programs could be implemented and/or enhanced.

Strategies:

- Coordinate with the NCWRC and Audubon Society to conduct bird surveys and studies.
- Coordinate with the North Carolina Division of Forestry and local fire departments to suppress wildfires.
- Foster relationships and work with the Partnership for the Sounds, Swan Quarter Service Group, the Hyde County government, regional birding clubs, and other local civic and sportsmen's clubs and organizations.
- Coordinate with local, county, state law enforcement agencies to facilitate cooperation and assistance in law enforcement activities.
- Pursue opportunities to conduct studies and research with universities, conservation groups, etc.

Objective

Support and enhance designated refuge programs by recruiting volunteers to donate an annual combined total of 300 hours of service. The refuge staff would train the volunteers and coordinate all activities.

Discussion:

The refuge currently accepts volunteer efforts, but does not recruit volunteers. Volunteers provide assistance to the refuge by helping with maintenance, public use, and the biological programs on the refuge.

Strategies:

- Recruit college interns and community volunteers to assist in refuge programs and "refuge workdays."
- Train and manage volunteers in accordance with Service policy.

Objective

Throughout the 15-year life of the CCP, manage administrative property and facilities in a manner that supports reaching refuge goals and objectives.

Discussion:

The staff is headquartered at the Mattamuskeet NWR.

Strategies:

- Maintain a total of 11 acres of administrative areas at Swanquarter NWR, including 4.5 miles of gravel roads and roadside vegetation annually.
- Conduct two annual property inventories.
- Purchase and replace property as need and as funds are available. Dispose of property in a timely fashion.
- Repair or replace facilities such as the Bell Island Pier, ditches, and signs as needed.

V. Plan Implementation

INTRODUCTION

Refuge lands are managed as defined under the Improvement Act. Congress has distinguished a clear legislative mission of wildlife conservation for all national wildlife refuges. National wildlife refuges, unlike other public lands, are dedicated to the conservation of the Nation's fish and wildlife resources and wildlife-dependent recreational uses. Priority projects emphasize the protection and enhancement of fish and wildlife species first and foremost, but considerable emphasis is placed on balancing the needs and demands for wildlife-dependent recreation and environmental education.

To accomplish the purpose, vision, goals, and objectives contained in this CCP for Swanquarter NWR, this section identifies projects, funding and personnel needs, volunteers, partnerships opportunities, step-down management plans, a monitoring and adaptive management plan, and plan review and revision.

PROPOSED PROJECTS

Listed below are the proposed project summaries and their associated costs for fish and wildlife population management, habitat management, resource protection, visitor services, and refuge administration over the next 15 years. This proposed project list reflects the priority needs identified by the public, planning team, and refuge staff based upon available information. These projects were generated for the purpose of achieving the refuge's objectives and strategies. The primary linkages of these projects to those planning elements are identified in each summary. The projects are listed in Tables 11 through 15, and summarized in Table 16.

Table 11. Projects supporting wildlife strategies

Personnel Projects	
Strategy	**Projects**
Conduct surveys, monitoring, studies, and investigations.	Use existing wildlife biologist. Recruit, hire, train new wildlife biologist (RONS 97012 and 99005).
Protect wildlife.	Use existing law enforcement officer.
Manage budget, contracts, personnel, and property.	Use existing refuge manager, assistant manager, and office assistant. Recruit, hire, train new assistant manager and office assistant (RONS 02002 and 97034).
Apply for flexible fund and other grants.	Use existing wildlife biologist. Recruit, hire, train new wildlife biologist (RONS 97012 and 99005).
Equipment Projects	
Maintain, repair, and replace equipment to survey and protect wildlife.	Replace equipment (various MMS projects). Replace vehicles (various MMS projects).

Table 12. Projects supporting habitat strategies

Personnel Projects	
Strategy	**Projects**
Conduct surveys, monitoring, studies, and investigations.	Use existing wildlife biologist. Recruit, hire, train new wildlife biologist (RONS 97012 and 99005).
Conduct prescribed burning.	Use existing fire management officer, wildlife biologist, forestry technicians, and engineering equipment operators. Recruit, hire, train new forestry technician.
Protect habitat.	Use existing law enforcement officer.
Manage budget, contracts, personnel, and property.	Use existing refuge manager, deputy manager, assistant manager, and office assistants. Recruit, hire, train new assistant manager and office assistant (RONS 02002 and 97034).
Apply for flexible fund and other grants.	Use existing wildlife biologist. Recruit, hire, train new wildlife biologist (RONS 97012 and 99005).
Equipment Projects	
Maintain, repair, and replace equipment to manage habitat.	Replace equipment (various MMS projects). Replace vehicles (various MMS projects).
Facility Projects	
Maintain, repair, and replace facilities to manage habitat.	Replace bulkheads and water control structures (various MMS projects).

Table 13. Projects supporting resource protection strategies

Personnel Projects	
Strategy	**Projects**
Maintain cooperation with agencies, organizations, and permit holders. Review permits and develop conditions for uses allowed by permits. Monitor pest animals and plants and permitted uses.	Use existing refuge manager, assistant manager, and wildlife biologist. Recruit, hire, train new assistant refuge manager (RONS 02002) and wildlife biologist (RONS 97012 and 99005).
Maintain equipment and facilities.	Use existing maintenance worker, and volunteers. Recruit, hire, train new equipment operators and tractor operator.
Enforce regulations.	Use existing law enforcement officer.
Manage budget, contracts, personnel, and property.	Use existing refuge manager, assistant manager, and office assistants. Recruit, hire, train new assistant refuge manager and office assistant (RONS 02002 and 97034).
Apply for flexible fund and other grants.	Use existing refuge manager, assistant manager, and wildlife biologist at Mattamuskeet Refuge. Recruit, hire, train new assistant refuge manager (RONS 02002) and wildlife biologist (RONS 97012 and 99005).
Equipment Projects	
Maintain, repair, and replace equipment as necessary.	Replace equipment (various MMS projects). Replace vehicles (various MMS projects).
Facility Projects	
Maintain, repair, and replace facilities as necessary.	Replace parking lots, and kiosks (various MMS projects).

Table 14. Projects supporting visitor services strategies

Personnel Projects	
Strategy	**Projects**
Plan, design, and conduct programs and outreach.	Recruit, hire, train new park ranger (public use) (RONS 97023).
Maintain education, interpretation, wildlife observation, and photography facilities.	Use existing maintenance staff and volunteers. Recruit, hire, train new equipment operators and tractor operator.
Protect visitors.	Use existing law enforcement officer.
Manage budget, contracts, personnel, and property.	Use existing refuge manager, deputy refuge manager, assistant manager, and office assistants. Recruit, hire, train new assistant manager and office assistant (RONS 02002 and 97034).
Apply for flexible fund and other grants.	Use existing refuge manager, deputy manager, assistant manager, and wildlife biologist
Equipment Projects	
Maintain, repair, and replace equipment to maintain facilities as necessary.	Replace equipment (various MMS projects). Replace vehicles (various MMS projects).
Facility Projects	
Develop, maintain, repair, and replace facilities as necessary.	Develop interpretive trail or boardwalk. Replace parking lots, kiosks, boat ramp, and boat dock (various MMS projects).

Table 15. Projects supporting refuge administration strategies

Personnel Projects	
Strategy	**Projects**
Manage budget, contracts, personnel, and property.	Use existing refuge manager, assistant manager, and office assistant. Recruit, hire, train new assistant refuge manager and office assistant (RONS 02002 and 97034).
Maintain equipment and facilities.	Use existing maintenance staff. Recruit, hire, train new equipment operators and tractor operator.
Equipment Projects	
Maintain, repair, and replace equipment as necessary.	Replace equipment (various MMS projects). Replace vehicles (various MMS projects).
Facility Projects	
Maintain, repair, and replace facilities as necessary.	Replace bulkheads, water control structures, parking lots, wildlife observation platforms, and kiosks (various MMS projects).

Table 16. Summary of projects

Station Rank/ Tier	Project Number	Cost (First Year, Recurring)	Positions	Project Title
1/1	97034	$122K ($65K/$57K)	1	Improve Office Efficiency and Public Relations
2/1	97015	$160K ($65K/$95K)	1	Improve Management and Protection (Assistant Refuge Manager)
3/1	97026	$146K ($65K/$81K)	1	Improve Recreational and Public Use Activities (Visitor Services Specialist)
4/1	00013	$131K ($65K/$66K)	1	Improve Equipment and Facility Maintenance (Maintenance Worker)
5/1	00015	$65.5K ($32.5K/$33K)	0.5	Improve Refuge Management Capabilities (Maintenance Worker)
6/1	00002	$139K ($65K/$74K)	1	Enhance Resource and Visitor Protection (Law Enforcement Officer)
7/1	97035	$133K ($65K/$68K)	1	Conduct Habitat Monitoring Studies (Wildlife Biologist)
8/1	97001	$133K ($65K/$68K)	1	Improve Biological Monitoring on Three Refuges (Wildlife Biologist)
9/1	00019	$108K ($108K/$0)	0	Conduct a Comprehensive Cultural Resource Survey
1/2	00014	$133K ($65K/$68K)	1	Improve Habitat and Wildlife Management Programs
Unranked	Not Entered	$50K ($50K/$0)	0	Develop an interpretive trail or boardwalk.

FUNDING AND PERSONNEL

Currently the Service has approved a staff of nine permanent positions for the refuge to serve Mattamuskeet, Swanquarter, and Cedar Island NWRs (Figure 7). Of the nine, eight full time equivalents are located at Mattamuskeet NWR. Of the nine positions, one is funded for fire management.

This CCP recommends adding another 4 FTE positions to existing staff for a total of 13 positions (Figure 8). Added would be one biologist, one refuge operations specialist, one maintenance worker, one park ranger (public use specialist), and one dedicated law enforcement officer (officer is currently shared with Pocosin Lakes NWR). The biologist would focus primarily on wildlife, fisheries, and habitat objectives and projects. The refuge operations specialist would assist the deputy refuge manager on all aspects of refuge management. The maintenance worker would be involved with

maintenance and upkeep of facilities (e.g., roads, other structures, and infrastructure). The park ranger position would be crucial to our expanded visitor services, including education and outreach. The dedicated law enforcement officer would enable the refuge to improve protection of natural and cultural resources while providing greater security and safety for staff and the visiting public. The law enforcement officer would provide a law enforcement presence during hunting and fishing seasons, and thus reduce the probability and severity of violations.

PARTNERSHIP/VOLUNTEERS OPPORTUNITIES

A major objective of this CCP is to establish partnerships with local volunteers, landowners, private organizations, and state and federal natural resource agencies. In the immediate vicinity of the refuge, opportunities exist to establish partnerships with sporting clubs, elementary and secondary schools, and community organizations. At regional and state levels, the Service might establish partnerships with organizations such as the North Carolina Wildlife Resources Commission and the North Carolina Division of Marine Fisheries, The Nature Conservancy, Ducks Unlimited, and National Audubon Society.

The refuge volunteer program and other partnerships generated would depend upon the number of staff positions the Service provides the refuge. As the Service commits staff and resources to the refuge, the refuge would take the opportunities to expand the volunteer program and develop partnerships. The refuges in the area depend on volunteers extensively, especially for their biological program. Volunteers currently do not contribute many hours of work at Swanquarter NWR; this CCP anticipates contributions of 300 hours. The refuge would utilize volunteers from the community and college interns. College interns rotate through work assignments in the visitor services, biology, and maintenance programs. The refuge provides quarters for college interns.

The refuge volunteer program and other partnerships generated would depend upon the number of staff positions the Service provides the refuge. As the Service commits staff and resources to the refuge, the refuge would take the opportunity to expand the volunteer program and to develop and deepen partnerships.

Figure 7. Current staffing chart of Mattamuskeet NWR shared with Swanquarter NWR

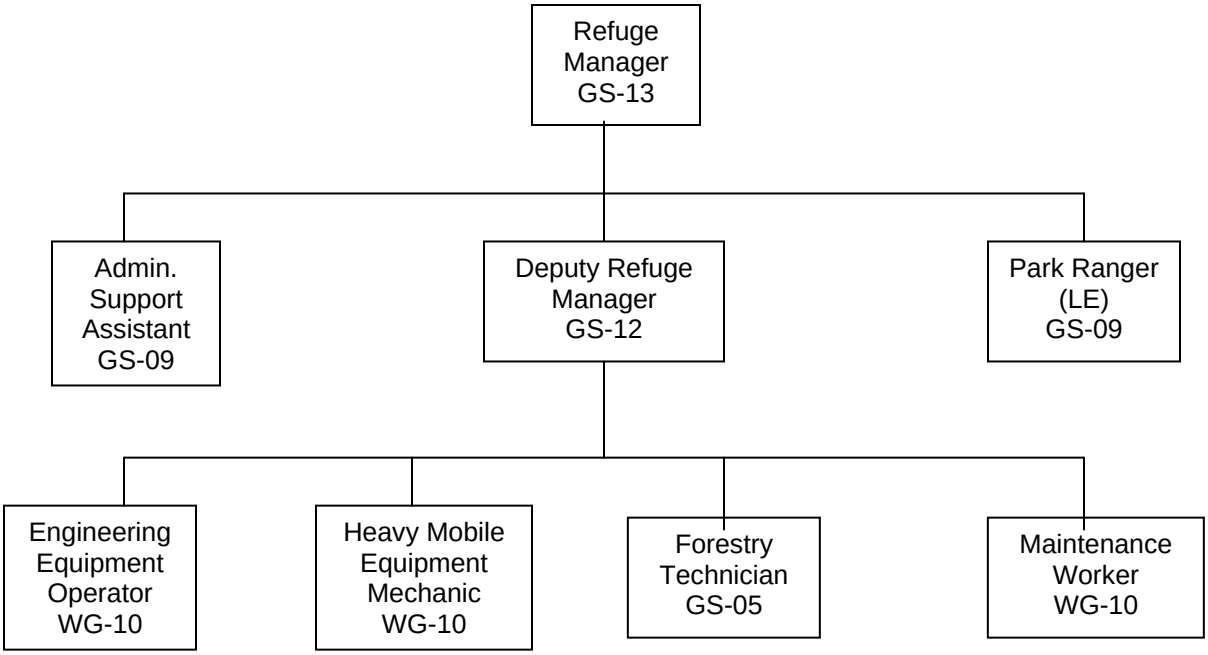
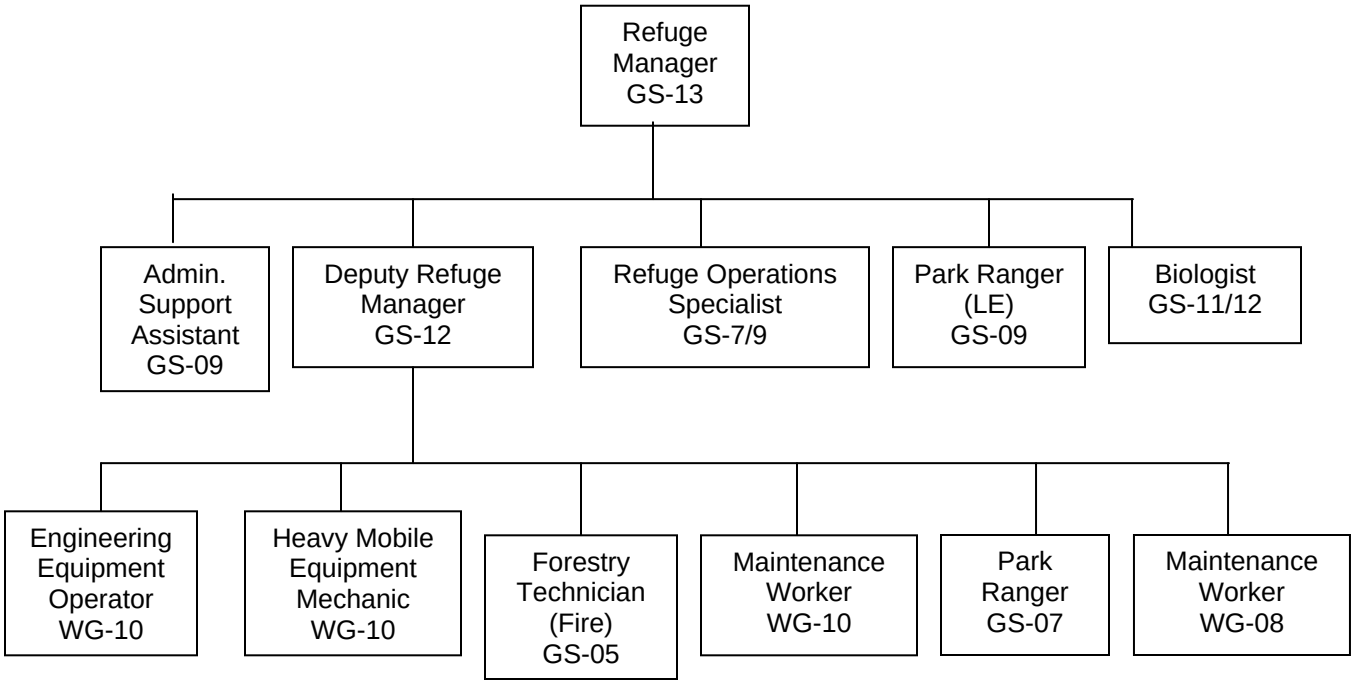


Figure 8. Proposed future staffing chart of Mattamuskeet NWR to be shared with Swanquarter NWR



STEP-DOWN MANAGEMENT PLANS

A CCP is a strategic plan that guides the direction of the refuge. A step-down management plan provides specific guidance on activities, such as habitat, fire, and visitor services. These plans (Table 17) are also developed in accordance with the National Environmental Policy Act, which requires the identification and evaluation of alternatives and public review and involvement prior to their implementation.

Table 17. Refuge step-down management plans

Step-down Plan	Completion Date
Biological Inventory/Monitoring Plan (Develop): This plan will describe inventory and monitoring techniques and time frames. The staff will inventory all plant communities and associations in the refuge, as well as all trust species (migratory birds including songbirds, neotropical passerines, and waterfowl), listed species (federal and state threatened, endangered and species of concern), key resident species, and monitor population trends.	2013
Habitat Management Plan (Develop): This plan will describe the overall desired future habitat conditions needed to fulfill the refuge's purpose and objectives. The plan will include sections dealing with each habitat on the refuge. The staff will develop procedures, techniques, strategies and timetables for achieving desired future conditions into an overall plan.	2013
Marsh Management Plan (Develop): This plan will describe strategies for meeting refuge marsh management objectives. Also the plan will address scrub/shrub habitat management.	2014
Integrated Pest Management Plan (Develop): This plan will address the complex issue of bringing exotic and nuisance plants and animals to a maintenance control level on the refuge. It will cover chemical pesticide use (aerial and ground application), mechanical eradication, and biological controls. The Nuisance/Exotic Animal and Plant control plans will be sections of this plan.	2016
Nuisance/Exotic Animal Control Plan (Update): This plan (as part of the Integrated Pest Management Plan) will describe survey, removal or control, and monitoring techniques for both terrestrial and aquatic nuisance and exotic animals (vertebrate and invertebrate). The plan will include wild dogs, feral cats, and resident Canada geese.	2012

Step-down Plan	Completion Date
Nuisance/Exotic Plant Control Plan (Develop): This plan (as part of the Integrated Pest Management Plan) will describe survey, removal or control, and monitoring techniques for both terrestrial and aquatic nuisance and exotic plants.	2016
Fire Management Plan (Update): This plan will describe wildland fire and prescribed fire management techniques that the staff will employ on the refuge. Wildfire control descriptions will include initial attack strategies and cooperative agreements with other agencies.	2014
Visitor Services Plan (Develop): This plan will describe the refuge's wildlife-dependent recreation, environmental education, and interpretive programs. It will address specific issues or items such as access, facility requirements, site plans, and handicapped accessibility. The environmental education, fishing, hunting, and sign plans will be sections of this plan.	2013
Environmental Education Plan (Develop): This plan will reflect the objectives and strategies of the CCP and address environmental education guidelines following Service standards.	2016
Hunting Plan (Update): This plan (as part of the Visitor Services Plan) addresses specific aspects of the refuge's recreational hunting program. It defines season structures, hunting areas, methods, access, handicapped accessibility, facilities needed, and refuge specific regulations. The plan currently identifies waterfowl hunting but will need to be updated to include bow hunting for deer.	2010
Fishing Plan (Update): This plan (as part of the Visitor Services Plan) will address specific aspects of the refuge's fishing program. It will define season structures, fishing areas, methods, access, handicapped accessibility, facilities needed, and refuge specific regulations.	2010
Sign Plan (Update): This plan (as part of the Visitor Services Plan) will describe the refuge's strategy for informing visitors via signage. It will incorporate Service guidelines.	2010

Step-down Plan	Completion Date
Law Enforcement Plan (Update): This plan will provide a reference to station policies, procedures, priorities, and programs concerning law enforcement.	2010
Cultural Resources Management Plan (Develop): This plan will develop overall guidance for the management of all cultural and historical resources on the refuge.	2023
Wilderness Management Plan (Develop): This plan will describe strategies and approaches for maintaining the wilderness character of the area and allowing natural processes to occur, and for educating the public regarding the value of the wilderness area.	2014

MONITORING AND ADAPTIVE MANAGEMENT

Adaptive management is a flexible approach to long-term management of biotic resources that is directed over time by the results of ongoing monitoring activities and other information. More specifically, adaptive management is a process by which projects are implemented within a framework of scientifically driven experiments to test the predictions and assumptions outlined within a plan.

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

PLAN REVIEW AND REVISION

This CCP would be reviewed annually as the refuge's annual work plans and budgets are developed. It would also be reviewed to determine the need for revision. A revision would occur if and when conditions change or significant information becomes available, such as a change in ecological conditions or a major refuge expansion. The final CCP would be augmented by detailed step-down management plans to address the completion of specific strategies in support of the refuge's goals and objectives. Revisions to the CCP and the step-down management plans would be subject to public review and NEPA compliance.

SECTION B. ENVIRONMENTAL ASSESSMENT

I. Background

INTRODUCTION

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

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

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

This CCP is needed to address current management issues, to provide long-term management direction for the refuge, and to satisfy the legislative mandates of the Improvement Act, which requires the preparation of a CCP for all national wildlife refuges.

PURPOSE AND NEED FOR ACTION

The purpose of the EA is to meet the purpose(s) of the refuge and the goals identified in the CCP (for which we evaluate each alternative). The purpose is to ensure that Swanquarter NWR serves as a sanctuary for migrating birds; conserves threatened and endangered species; serves the development, advancement, management, conservation, restoration, and protection of fish, wildlife, and habitat resources; provides opportunities for compatible wildlife-dependent recreation; promotes awareness and appreciation of natural resources; administers and protects the wilderness character; and protects and preserves archaeological and historical resources.

This EA addresses the need to adopt a 15-year management plan for the Swanquarter NWR that provides guidance for future refuge management and meets the requirements of the Improvement Act.

DECISION FRAMEWORK

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

PLANNING STUDY AREA

Swanquarter NWR is located on the Pamlico Sound in Hyde County, North Carolina. The refuge is located at the southern end of a broad float and swampy peninsula in northeastern North Carolina, and is surrounded by brackish marsh and cropland. The village of Swan Quarter (population of 275 in the year 2000) is located at the northern boundary of the refuge, and the village of Engelhard (population of 1,561 in the year 2000) is fifteen miles east of the eastern boundary of the refuge. The major metropolitan area of Raleigh-Durham-Chapel Hill, North Carolina (population of 1,038,703 in the year 2000) is 180 miles west of the refuge, and Norfolk-Virginia Beach-Hampton Roads, Virginia (population 1,569,541 in the year 2000) is 150 miles north of the refuge. The Pamlico Sound borders the southern boundary of the refuge. This region is part of the physiographic area known as the South Atlantic Coastal Plain and the Service's administrative ecosystem known as the Roanoke-Tar-Neuse-Cape Fear Ecosystem.

This EA will identify management on refuge lands and waters.

AUTHORITY, LEGAL COMPLIANCE, AND COMPATIBILITY

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

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

COMPATIBILITY

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

An interim compatibility determination is a document that assesses the compatibility of an activity during the period of time the Service first acquires a parcel of land to the time a formal, long-term management plan for that parcel is prepared and adopted. The Service has completed an interim compatibility determination for the six priority general public uses of the system, as listed in the National Wildlife Refuge System Improvement Act of 1997. These uses are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

PUBLIC INVOLVEMENT AND THE PLANNING PROCESS

In accordance with Service guidelines and NEPA recommendations, public involvement has been a crucial factor throughout the development of the Draft CCP/EA for Swanquarter NWR. This Draft CCP/EA has been written with input and assistance from interested citizens, conservation organizations, and employees of local and state agencies. The participation of these stakeholders and their ideas has been of great value in setting the management direction for Swanquarter NWR. The Service, as a whole, and the refuge staff, in particular, are very grateful to each one who has contributed time, expertise, and ideas to the planning process. The staff remains impressed by the passion and commitment of so many individuals for the lands and waters administered by the refuge.

During the preplanning and public scoping phases of the CCP, a myriad of issues and concerns were raised. While some of these issues and concerns are important to the future of the refuge, many are not within the sole jurisdiction of the refuge and some are completely outside of the refuge's control. Many of the issues and concerns raised represent opportunities for increased coordination with existing and potential partners.

For more detailed information about the planning process and the identification of issues, see Section A, Chapter III, Summary of Issues, Concerns, and Opportunities. A complete summary of the issues and concerns is provided in Appendix D.

II. Affected Environment

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

III. Description of Alternatives

FORMULATION OF ALTERNATIVES

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

The three alternatives identified and evaluated represent different approaches to provide permanent protection, restoration, and management of the refuge's fish, wildlife, plants, habitats, and other resources, as well as compatible wildlife-dependent recreation. Refuge staff assessed the biological conditions and analyzed the external relationships affecting the refuge. This information contributed to the development of refuge goals and, in turn, helped to formulate the alternatives. As a result, each alternative presents different sets of objectives for reaching refuge goals. Each alternative was evaluated based on how much progress it would make and how it would address the identified issues related to fish and wildlife populations, habitat management, resource protection and conservation, visitor services, and refuge administration. A summary of the three alternatives is provided in Table 18.

DESCRIPTION OF ALTERNATIVES

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

ALTERNATIVE A – CURRENT MANAGEMENT – NO ACTION

This alternative represents the current management of the refuge. Under this alternative, the Service would protect, maintain, restore, and enhance 16,411 acres of refuge lands for resident wildlife, waterfowl, migratory nongame birds, and threatened and endangered species. The refuge staff would implement management programs with inventory data only on waterfowl, colonial nesting birds, and red wolves. They would direct all refuge management actions towards achieving the refuge's primary purposes (conserving migratory habitat for waterfowl; and helping to meet the habitat conservation goals of the North American Waterfowl Management Plan), while contributing to other national, regional, and state goals to protect and restore red wolf and neotropical breeding bird populations. The Service would practice active habitat management through prescribed burning in marshes and forests, management of invasive species, and firebreak maintenance.

The Service would maintain the current levels of wildlife-dependent recreation activities (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation). The refuge roads would be available for vehicular and pedestrian access to support wildlife-dependent recreation to the extent that these opportunities do not interfere substantially with or detract from the achievement of wildlife conservation. The staff would maintain four miles of roads and a fishing pier. The refuge would continue quality waterfowl hunting programs for 300 annual users consistent with sound biological principles. The Service would permit fishing for 50,000 anglers from the fishing pier, along the shoreline of the Pamlico Sound, and banks of the ditches and streams

annually. Visitors can observe and photograph wildlife anywhere on the refuge. The staff would conduct environmental education programs when requested by teachers as staff is available, and participate in one outreach event annually. They would allow the refuge to be used as an outdoor classroom and research site.

Under this alternative, the refuge would develop a Land Protection Step-down Plan and seek acquisition of property from willing sellers within an expanded acquisition boundary (10 percent or less of current area) if the Service approves one. The Service would make acquired lands part of the refuge, available for compatible public wildlife-dependent recreation and environmental education opportunities. Purchases from willing sellers would be the preferred option to expand conservation efforts in the acquisition area. Other important land protection options include outreach and partnerships with adjacent landowners, hunt clubs, and the Natural Resources Conservation Service (NCRS) through conservation easements, cooperative agreements, and federal programs, such as the Wetlands Reserve Program (WRP). These land conservation options would promote the linkage of forest and brackish marsh tracts and contribute to overall natural resource conservation within the acquisition area.

The Service would maintain the refuge as funding allows. The staff for Mattamuskeet, Swanquarter, and Cedar Island NWRs would have nine full-time equivalents (FTE) with eight people headquartered at Mattamuskeet NWR and one at Cedar Island NWR. The volunteer program would have no annual target, but would accept volunteers who would be coordinated by a collateral duty staff member.

ALTERNATIVE B – MODERATELY EXPAND PROGRAMS – PROPOSED ALTERNATIVE

This alternative represents a moderate increase over the current management of the refuge. Under this alternative, the Service would protect, maintain, restore, and enhance 16,411 acres of refuge lands for resident wildlife, waterfowl, migratory nongame birds, and threatened and endangered species. The refuge staff would implement management programs with inventory data on waterfowl, colonial nesting birds, land birds, wading birds, shorebirds, marsh birds, reptiles, amphibians, and red wolves. They would direct all refuge management actions towards achieving the refuge's primary purposes (conserving migratory habitat for waterfowl; and helping to meet the habitat conservation goals of the North American Waterfowl Management Plan), while contributing to other national, regional, and state goals to protect and restore red wolf and neotropical breeding bird populations. The Service would practice active habitat management through prescribed burning in marshes and forests, management of invasive species, and firebreak maintenance. The staff would actively monitor the response of wildlife and habitat to management activities and adapt management plans to the results of the monitoring.

The Service would moderately increase the current levels of wildlife-dependent recreation activities (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation). The refuge roads would be available for vehicular and pedestrian access to support wildlife-dependent recreation to the extent that these opportunities do not interfere substantially with or detract from the achievement of wildlife conservation. The staff would maintain four miles of roads, and a fishing pier, and construct and maintain an interpretive trail or boardwalk. The refuge would continue quality waterfowl hunting programs for 400 annual users and initiate a deer hunting program for 100 annual users with archery equipment consistent with sound biological principles. The Service would permit fishing for 55,000 anglers from the fishing pier, along the shoreline of the Pamlico Sound, and banks of the ditches and streams annually. Visitors can observe and photograph wildlife anywhere on the refuge. The staff would conduct two to ten environmental education programs for local school students, participate in two outreach programs annually, and maintain a visitor contact

station at Mattamuskeet NWR. The Service would continue to allow the refuge to be used as an outdoor classroom and research site.

Under this alternative, the refuge would develop a Land Protection Step-down Plan and seek acquisition of property from willing sellers within an expanded acquisition boundary (10 percent or less of current area) if the Service approves one. The Service would make acquired lands part of the refuge, available for compatible public wildlife-dependent recreation and environmental education opportunities. Purchases from willing sellers would be the preferred option to expand conservation efforts in the acquisition area. Other important land protection options include outreach and partnerships with adjacent landowners, hunt clubs, and the Natural Resources Conservation Service (NCRS) through conservation easements, cooperative agreements, and federal programs, such as the Wetlands Reserve Program (WRP). These land conservation options would promote the linkage of forest and brackish marsh tracts and contribute to overall natural resource conservation within the acquisition area.

The Service would maintain the refuge as funding allows. The staff for Mattamuskeet, Swanquarter, and Cedar Island NWRs would have thirteen full-time equivalents (FTE) with twelve people headquartered at Mattamuskeet NWR and one at Cedar Island NWR. The volunteer program would have an annual target of 300 hours and would be coordinated by a collateral duty staff member.

ALTERNATIVE C – OPTIMALLY EXPAND PROGRAMS

This alternative represents a substantial increase over the current management of the refuge. Under this alternative the Alternative B activities would be expanded further, including monitoring and surveying of wildlife, wilderness area management, and the public use programs. The Service would protect, maintain, restore, and enhance 16,411 acres of refuge lands for resident wildlife, waterfowl, migratory nongame birds, and threatened and endangered species. The refuge staff would implement management programs with inventory data on waterfowl, colonial nesting birds, land birds, wading birds, shorebirds, marsh birds, reptiles, amphibians, fish, invertebrates, and mammals. They would direct all refuge management actions towards achieving the refuge's primary purposes (conserving migratory habitat for waterfowl; and helping to meet the habitat conservation goals of the North American Waterfowl Management Plan), while contributing to other national, regional, and state goals to protect and restore red wolf and neotropical breeding bird populations. The Service would practice active habitat management through prescribed burning in marshes and forests, management of invasive species, and firebreak maintenance. The staff would actively monitor the response of wildlife and habitat to management activities and adapt management plans to the results of the monitoring. Moist-soil units, wetlands, and impoundments would be constructed (if adjacent suitable cropland were acquired) and/or managed for the benefit of birds and mammals.

The Service would optimally expand the current levels of wildlife-dependent recreation activities (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation). The refuge roads would be available for vehicular and pedestrian access to support wildlife-dependent recreation to the extent that these opportunities do not interfere substantially with or detract from the achievement of wildlife conservation. The staff would maintain four miles of roads, a fishing pier, and construct and maintain an interpretive trail or boardwalk, as well as develop a canoe trail. The refuge would continue quality waterfowl hunting programs for 400 annual users and initiate a deer hunting program for 200 annual users with archery equipment and primitive firearms consistent with sound biological principles. The Service would permit fishing for 65,000 anglers from the fishing pier, along the shoreline of the Pamlico Sound, and banks of the ditches and streams annually. Visitors can observe and photograph wildlife anywhere on the refuge and a photo blind would be constructed. The staff would conduct ten to fifteen environmental education programs for

local school students, participate in four outreach programs annually, and maintain a visitor contact station at Mattamuskeet NWR. The Service would continue to allow the refuge to be used as an outdoor classroom and research site.

Under this alternative, the refuge would develop a Land Protection Step-down Plan and seek acquisition of property from willing sellers within an expanded acquisition boundary (10 percent or less of current area) if the Service approves one. The Service would make acquired lands part of the refuge, available for compatible public wildlife-dependent recreation and environmental education opportunities. Purchases from willing sellers would be the preferred option to expand conservation efforts in the acquisition area. Other important land protection options include outreach and partnerships with adjacent landowners, hunt clubs, and the Natural Resources Conservation Service (NCRS) through conservation easements, cooperative agreements, and federal programs such as the Wetlands Reserve Program (WRP). These land conservation options would promote the linkage of forest and brackish marsh tracts and contribute to overall natural resource conservation within the acquisition area.

The Service would maintain the refuge as funding allows. The staff for Mattamuskeet, Swanquarter, and Cedar Island NWRs would have fifteen and a half full-time equivalents (FTE) with fourteen and a half people headquartered at Mattamuskeet and one at Cedar Island. The volunteer program would have an annual target of 1,000 hours and would be coordinated by a collateral duty staff member. One or two interns would be hosted annually.

FEATURES COMMON TO ALL ALTERNATIVES

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

REFUGE ADMINISTRATION

The maintenance and operation of the refuge's administrative facilities would continue, regardless of the alternative selected. Periodic upgrading of facilities is necessary for safety and accessibility and to support staff and management needs. The staff has identified funding needs for several projects, including providing additional facilities and equipment to support refuge operation and maintenance.

INTERAGENCY COORDINATION AND COOPERATIVE AGREEMENTS

Coordination and cooperation between Service staff and local, state, and federal agencies, as well as with universities and non-governmental organizations would continue, regardless of the alternative selected. Refuge operations, such as the fire management program, research, education and outreach efforts, depend on and are enhanced by the contributions from experts and volunteers outside of the refuge staff.

EDUCATION AND VISITOR SERVICES

As the refuge's visitor services program develops, the staff would continue to assess the program and its potential impact on refuge resources. The refuge would change the program as needed to address any impacts identified and to respond to anticipated wildlife population increases. To ensure a quality wildlife-dependent recreation experience while achieving the 'wildlife first' mandate, the Service would limit the number of users and conflicts among the users by the following: (1) permitting uses; (2) designating roads, trails, and sites for specific kinds of wildlife-dependent recreation use; and (3) permitting uses at certain times of the year.

There are a number of situations that may warrant future refuge closures or restrictions on access. Examples of these situations include, but are not limited to, the following: protection of threatened or endangered species; protection of nesting birds and bear den sites; restriction of recreation activities to achieve specific wildlife population objectives; minimization of conflicts with other refuge management programs; and limitations from inadequate funds and/or staff to administer use.

LAND ACQUISITION

The staff would develop a Land Protection Step-Down Plan. If the Service approves the plan and an expanded acquisition boundary (expansion less than 10 percent of current area), the refuge would give the acquisition of land adjacent to Service-owned lands a high priority. All land acquisitions are subject to contaminant surveys.

Funding for land acquisition would come from the Land and Water Conservation Fund, Migratory Bird Conservation Fund, or donations from conservation organizations. The Service could use conservation easements and leases sometimes to obtain minimum interests necessary to satisfy refuge objectives if the refuge staff could adequately manage uses of the areas for the benefit of wildlife. The Service could negotiate management agreements with local, state, and federal agencies, and accept conservation easements. Public or private conservation organizations may own some tracts of interest to the Service. The Service would work with interested organizations to identify additional areas needing protection and provide technical assistance if needed. The acquisition of private lands is entirely contingent on the landowners and their willingness to participate.

COMPARISON OF THE ALTERNATIVES BY ISSUE

Table 18. Comparison of alternatives by management program or issue for Swanquarter NWR

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Fish	No active surveying or monitoring being conducted by refuge staff. Support cooperating agencies and universities with monitoring of fish when possible.	Cooperate with and assist agencies and universities to conduct baseline surveys of waters on the refuge to document species composition and population parameters.	Cooperate with agencies and universities to conduct baseline surveys of waters on the refuge to document species composition and population parameters. Monitor fish populations periodically in cooperation with cooperating agencies and universities.
Invertebrate Species	No active monitoring or surveying being conducted by refuge staff. Support cooperating agencies and universities with studies when possible.	Manage refuge resources to protect invertebrate species. Assist cooperating agencies and universities with studies as needed.	Manage refuge resources to protect invertebrate species. Assist cooperating agencies and universities with studies as needed. Monitor and survey invertebrates in selected habitats.
Land Birds	Have completed point counts to establish baseline data for the wet pine flatwoods habitat. Staff and public note unusual land bird observations. Support cooperating agencies and universities with studies when possible.	Have completed point counts to establish baseline data for the wet pine flatwoods habitat. Complete point counts for other major habitat types. Establish and participate in Christmas bird count. Staff and public note unusual land bird observations. Assist cooperating agencies and universities with studies as needed.	Have completed point counts to establish baseline data for the wet pine flatwoods habitat. Complete point counts for other major habitat types. Establish and participate in Christmas bird count. Establish one Monitoring Avian Productivity and Survivorship (MAPS) station in one habitat type. Staff and public note unusual land bird observations. Assist cooperating agencies and universities with studies as needed.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Mammals	Cooperate with the Red Wolf Recovery Program. Staff and public note unusual mammal observations. Assist cooperating agencies and universities with studies as needed.	Conduct herd health checks on white-tailed deer every five years in cooperation with Southeastern Wildlife Disease Study Group. Collect harvest data on deer as needed. Cooperate with the Red Wolf Recovery Program. Staff and public note unusual mammal observations. Assist cooperating agencies and universities with studies as needed.	Conduct herd health checks on white-tailed deer every five years in cooperation with Southeastern Wildlife Disease Study Group. Collect harvest data on deer as needed. Develop inventory within five years of reaching minimum staffing levels. Monitor furbearers and small mammals in the marsh habitats according to the inventory plan. Cooperate with the Red Wolf Recovery Program. Staff and public note unusual mammal observations. Assist cooperating agencies and universities with studies as needed.
Reptiles and Amphibians	No active monitoring or surveying being conducted by refuge staff. Assist cooperating agencies and universities with studies as needed.	Develop baseline data of reptile and amphibian species occurrence. Conduct annual alligator survey within one year after reaching minimum staffing levels. On a continual basis, monitor and manage refuge resources to protect federal and state listed reptile and amphibian species. Assist cooperating agencies and universities with studies as needed.	Same as Alternative B.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Shorebirds	No active monitoring. Staff and public note unusual shorebird observations.	Establish and participate in annual Christmas bird count. Staff and public note unusual shorebird observations.	Establish and participate in annual Christmas bird count. Conduct spring (April-June) and fall (July-September) ground surveys every 10 days in suitable habitat for certain years. Staff and public note unusual shorebird observations.
Marsh Birds	Assist cooperating agencies and universities with studies as needed.	Establish and participate in annual Christmas bird count. Conduct breeding season callback survey every 10 days along suitable habitat. Staff and public note unusual marsh bird observations. Assist cooperating agencies and universities with studies as needed.	Establish and participate in annual Christmas bird count. Conduct breeding season callback survey every 10 days along suitable habitat. Establish marsh management guidelines as they apply to marsh birds within fifteen years. Staff and public note unusual marsh bird observations. Assist cooperating agencies and universities with studies as needed.
Wading and Colonial Nesting Birds	Conduct annual nesting survey of colonial nesting birds. Staff and public note unusual wading bird observations. Assist cooperating agencies and universities with studies as needed.	Establish and participate in annual Christmas bird count. Conduct annual nesting and recruitment survey of wading and colonial nesting birds. Evaluate the impacts of management activities on wading and colonial nesting birds. Post and protect nesting colonies. Staff and public note unusual wading bird observations. Assist cooperating agencies and universities with studies as needed.	Establish and participate in annual Christmas bird count. Conduct annual nesting and recruitment survey of wading and colonial nesting birds. Evaluate the impacts of management activities on wading and colonial nesting birds. Post and protect nesting colonies. Manage wading and colonial nesting bird foraging habitat in managed and restored wetlands. Staff and public note unusual wading bird observations. Assist cooperating agencies and universities with studies as needed.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Waterfowl	Conduct monthly aerial surveys during the migration period (November-February) annually. Conduct midwinter waterfowl survey. Monitor and investigate mortality of waterfowl from disease annually. Staff and public note unusual waterfowl observations. Assist cooperating agencies and universities with studies as needed.	Establish and participate in annual Christmas bird count. Conduct bimonthly aerial surveys and weekly ground surveys during the migration period (November-February) annually. Conduct midwinter waterfowl survey. Conduct brood surveys of American black duck annually. Monitor and investigate mortality of waterfowl from disease annually. Support special banding programs as directed by the Service. Staff and public note unusual waterfowl observations. Assist cooperating agencies and universities with studies as needed.	Establish and participate in annual Christmas bird count. Conduct bimonthly aerial surveys and weekly ground surveys during the migration period (October-March) annually. Conduct midwinter waterfowl survey. Conduct brood surveys of American black duck annually. Erect, maintain, and monitor 25 new wood duck boxes within five years of full staffing. Monitor and investigate mortality of waterfowl from disease annually. Support special banding programs as directed by the Service. Evaluate the impacts of recreational and commercial boating on the ecology of wintering waterfowl when funded. Staff and public note unusual waterfowl observations. Assist cooperating agencies and universities with studies as needed.
Admin-istrative Areas	Maintain a total of 11 acres of administrative areas, including 4.5 miles of gravel roads and roadside vegetation annually.	Same as Alternative A.	Same as Alternative A.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Brackish Marsh	Manage 12,300 acres of brackish marsh. Conduct occasional prescribed burning.	Manage 12,300 acres of brackish marsh. Conduct regular prescribed burning. Monitor the effects of burning on plant diversity and productivity and adapt the fire management plan accordingly. Evaluate the effectiveness of created openings in the marsh for migratory birds.	Same as Alternative B.
Cypress-Gum Swamp	Protect 600 acres of cypress-gum swamp.	Same as Alternative A.	Same as Alternative A.
Estuarine Fringe Loblolly Pine Forest	Protect and manage 2,500 acres of estuarine fringe loblolly pine forest. Conduct occasional prescribed burning. Cooperate with North Carolina Forest Service and others on wildland fire activities as needed.	Same as Alternative A.	Same as Alternative A.
Low Pocosin	Protect 700 acres of low pocosin. Conduct occasional prescribed burning.	Protect 700 acres of low pocosin. Conduct regular prescribed burning.	Same as Alternative B.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Managed Wetlands (Impound-ments)	None.	Same as Alternative A.	Construct, manage and maintain moist-soil units and submerged aquatic vegetation if cropland is acquired and converted. Manage impoundments for migratory birds. Manage to produce submerged aquatic vegetation, native emergent annual seed-producing vegetation, and mud flats. Conduct annual vegetation transects; conduct appropriate invertebrate surveys and correlate data to vegetation data. Monitor water levels weekly. Control common reed and alligator weed annually. Install and maintain pump stations and water control structures to manage water levels efficiently. Assist cooperating agencies and universities with studies as needed.
Pine Savanna	Protect 250 acres of pine savanna. Conduct occasional prescribed burning.	Protect 250 acres of pine savanna. Conduct regular prescribed burning.	Same as Alternative B.
Capital Property	Conduct two annual property inventories on property. Purchase and replace property as funds are available; dispose of excess property in a timely fashion.	Same as Alternative A.	Same as Alternative A.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Office Space and Utilities	Staff headquartered at the Mattamuskeet NWR.	Same as Alternative A.	Same as Alternative A.
Personnel	Manage personnel for maximum performance and efficiency. Recognize employee performance annually through the employee incentive program. The staff equivalent to 0.5 FTE from the Mattamuskeet NWR Complex Office is shared between Mattamuskeet and Swanquarter NWRs. Provide staff professional, technical and leadership development training as allowable under current funding levels.	Manage personnel for maximum performance and efficiency. Recognize employee performance annually through the employee incentive program. The staff equivalent to 1.5 FTE from the Mattamuskeet NWR Complex Office would be shared between Mattamuskeet and Swanquarter NWRs. Provide staff professional, technical and leadership development training as funds are available.	Manage personnel for maximum performance and efficiency. Recognize employee performance annually through the employee incentive program. The staff equivalent to 3 FTE from the Mattamuskeet NWR Complex Office would be shared between Mattamuskeet and Swanquarter NWRs. Provide staff professional, technical and leadership development training mandated by Service policy.
Real Property	Manage 16,411 acres of land with roads, ditches, Bell Island Pier and signage. Repair or replace facilities as funding is available.	Manage 16,411 acres of land with roads, ditches, Bell Island Pier, other public use facilities, and signage. Repair or replace facilities as needed.	Same as Alternative B.
Maintenance Facilities	None at present.	None planned.	Same as Alternative B.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Land Protection (Existing Area Plus <10% of Existing Area)	Protect existing refuge lands/habitats (16,411 acres) and purchase lands adjacent to refuge (less than 10% of the existing refuge area) from willing landowners when opportunities arise. Survey and post boundaries as needed.	Protect existing refuge lands/habitats (16,411 acres) and purchase lands adjacent to refuge (less than 10% of the existing refuge area) from willing landowners when opportunities arise. Survey and post boundaries as needed. Identify and pursue funding to purchase key properties to add to the refuge.	Protect existing refuge lands/habitats (16,411 acres) and purchase lands adjacent to refuge (less than 10% of the existing refuge area) from willing landowners when opportunities arise. Survey and post boundaries as needed. Develop plan to identify key parcels to add to the refuge. Actively pursue funding and purchase of key properties.
Cultural Resources	Surveys have been conducted around existing facilities. As new development is planned, regional and state archeologists will be contacted.	Surveys have been conducted around existing facilities. As new development is planned, regional and state archaeologists will be contacted. Prepare and begin to implement a Cultural Resources Management Plan.	Same as Alternative B.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Interagency Coordination and Cooperative Agreements	Coordinate continuously with the North Carolina Wildlife Resources Commission, North Carolina Forest Service, universities, and other local, state, and federal agencies and non-governmental organizations to conduct refuge operations, research, environmental education, and fire management.	Same as Alternative A.	Same as Alternative A.
Law Enforcement	Conduct occasional patrols to provide a minimal law enforcement presence on the refuge. Coordinate with local, state and federal law enforcement authorities to ensure compliance with local, state, and federal laws. Prosecute 10 violations annually. Monitor activities on land adjacent to the refuge associated with endangered species and migratory birds.	Conduct routine patrols to maintain a law enforcement presence on the refuge. Coordinate with local, state, and federal law enforcement authorities to ensure compliance with local, state, and federal laws. Prosecute 10-50 violations annually. Monitor activities on land adjacent to the refuge associated with endangered species and migratory birds. Enforce regulations as needed.	Same as Alternative B.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Permits	Review, develop conditions for, and monitor compliance for up to 5 special use permits annually.	Review, develop conditions for, and monitor compliance for up to 10 special use permits annually.	Review, develop conditions for, and monitor compliance for up to 15 special use permits annually.
Pest Animals and Insects	Identify non-native pest animals (nutria, fire ants) that conflict with refuge objectives annually. Control pest animals when possible. Cooperate with the State Health Department to monitor for mosquito born diseases.	Identify and monitor non-native pest animals (nutria, fire ants) that conflict with refuge objectives annually. Develop and implement a Noxious Animal Management Plan within five years of reaching minimum staffing levels. Cooperate with the State Health Department to monitor for mosquito born diseases.	Monitor non-native pest animals (nutria, fire ants) that conflict with refuge objectives annually. Develop and implement a Noxious Animal Management Plan within five years of reaching minimum staffing levels. Cooperate with the State Health Department to monitor for mosquito born diseases.
Pest Plants	Monitor non-native and invasive pest plants (common reed) that conflict with refuge objectives annually. Control pest plants when possible.	Monitor non-native and invasive pest plants (common reed) that conflict with refuge objectives annually. Control pest plants as needed.	Same as Alternative B.
Restoration	No activity at present.	None planned. Assist adjacent private landowners when possible to prevent spread of noxious weeds onto refuge.	Restore habitat on new acquisitions or easements. Assist adjacent private landowners to prevent spread of noxious weeks onto the refuge.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Water Quality	Conduct refuge management activities to minimize impacts on water quality. Assist cooperating agencies and universities with monitoring when able.	Conduct refuge management activities to minimize impacts on water quality. Cooperate with other agencies to identify and control erosion and sedimentation in and around the refuge to protect SAV. Support water quality monitoring conducted by university and State agencies. Develop and implement water quality and SAV monitoring plan within three years of reaching minimum staff levels. Monitor salinity and other parameters in the sound and tidal creeks according to plan. Assist cooperating agencies and universities with monitoring.	Same as Alternative B.
Wilderness Areas and other Special Area Designations	Allow natural processes to dominate on 8,800 acres of the Swanquarter National Wilderness Area. Conduct prescribed burning to mimic the natural fire cycle. Monitor air quality by operation of IMPROVE site weekly.	Evaluate habitats and determine the necessity to nominate areas for special designation. Allow natural processes to dominate on 8,800 acres of the Swanquarter National Wilderness Area. Conduct prescribed burning to mimic the natural fire cycle. Monitor air quality by operation of IMPROVE site weekly. Initiate baseline monitoring of vegetation in wilderness area within two years of reaching minimum staffing levels.	Evaluate habitats and determine the necessity to nominate areas for special designation. Allow natural processes to dominate on 8,800 acres of the Swanquarter National Wilderness Area. Conduct prescribed burning to mimic the natural fire cycle. Monitor air quality by operation of IMPROVE site weekly; establish and operate a haze monitoring station. Initiate regular baseline monitoring of vegetation in wilderness area within two years of reaching minimum staffing levels.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Wildlife Disease Control and Prevention	Cooperate with state and federal agencies to monitor and manage disease in wildlife as requested.	Monitor white-tailed deer in cooperation with the Southeastern Wildlife Disease Study Group every five years. Cooperate with state and federal agencies to monitor and manage disease in wildlife as requested. Monitor other wildlife in conjunction with other activities. Initiate investigations as needed.	Same as Alternative B.
Commercial Ecotours	Review and evaluate proposed activities on a case-by-case basis.	Same as Alternative A.	Same as Alternative A.
Environ-mental Education	Conduct two programs annually, as requested, to local school groups. Host university students performing research.	Conduct two to ten programs for local school groups, or as requested. Host university students performing research.	Conduct ten to fifteen programs for local school groups, or as requested. Also contact area schools and inform them of the availability of the Refuge for environmental programs. Host university students performing research.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Fishing	Provide fishing from Bell Island Pier and the shorelines on the entire refuge twelve months each year. Provide access for disabled anglers on the Pier. Cooperate with NCWRC on enforcement of fishing and boating regulations annually.	Provide fishing from Bell Island Pier and the shorelines on the entire refuge for 55,000 angler use days twelve months each year. Provide access for disabled anglers on the Pier. Cooperate with NCWRC on enforcement of fishing and boating regulations annually.	Provide fishing from Bell Island Pier and the shorelines on the entire refuge for 65,000 angler use days twelve months each year. Provide access for disabled anglers on the Pier. Cooperate with NCWRC on enforcement of fishing and boating regulations annually.
Hunting	Provide waterfowl hunting opportunities in hunts on 6,000 acres for about 300 hunter days annually. Cooperate with NCWRC on enforcement of hunting regulations annually.	Provide waterfowl hunting opportunities in hunts on 6,000 acres for about 400 hunter days annually. Provide opportunities for deer hunting with archery equipment for about 100 hunter days on the upland portions of the refuge within five years. Cooperate with NCWRC on enforcement of hunting regulations annually.	Provide waterfowl hunting opportunities in hunts on 6,000 acres for about 400 hunter days annually. Provide opportunities for deer hunting with archery equipment and primitive weapons for about 200 hunter days on the upland portions of the refuge within five years. Cooperate with NCWRC on enforcement of hunting regulations annually.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Interpretation	Maintain a kiosk to inform the public about the refuge and its resources annually. Maintain a visitor contact station with a brochure rack and wildlife exhibits in the refuge office at Mattamuskeet NWR annually. Update/revise the refuge brochure as needed.	Maintain a kiosk to inform the public about the refuge and its resources annually. Maintain a visitor contact station with a brochure rack and wildlife exhibits in the refuge office at Mattamuskeet NWR annually. Update/revise the refuge brochure as needed. Develop and maintain one interpretative trail or boardwalk within ten years of plan approval.	Maintain a kiosk to inform the public about the refuge and its resources annually. Maintain a visitor contact station with a brochure rack and wildlife exhibits in the refuge office at Mattamuskeet NWR annually. Develop and maintain one interpretative trail or boardwalk within five years of plan approval. Develop additional refuge brochures as the needs are identified. Update/revise a refuge brochure annually.
Non-Wildlife Dependent Public Uses	Evaluate non-wildlife dependent activities on a case-by-case basis. Conduct compatibility determinations on proposed uses.	Same as Alternative A.	Same as Alternative A.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Outreach	Represent the refuge in contact with the general public on a daily basis. Respond to daily requests from the public about refuge activities and resources. Issue one news release annually. Participate in at least one Service outreach initiative annually. Cooperate with print and video media to promote refuge activities. Maintain an internet web site.	Represent the refuge in contact with the general public on a daily basis. Respond to daily requests from the public about refuge activities and resources. Issue four news releases annually, and develop news releases for special events. Participate in at least two Service outreach initiatives annually. Cooperate with print and video media to promote refuge activities. Maintain an internet web site and update annually.	Represent the refuge in contact with the general public on a daily basis. Respond to daily requests from the public about refuge activities and resources. Issue six news releases annually, and develop news releases for special events. Participate in at least four Service outreach initiatives annually. Initiate contacts with print and video media to promote refuge activities. Maintain an internet web site and update monthly.
Refuge Support	Cooperate with partners for environmental education programs. Support relationships with birding groups, the Hyde County government, and local civic organizations.	Cooperate with partners for environmental education programs. Foster relationships with regional birding clubs, the Hyde County government, and local civic organizations.	Cooperate with partners for environmental education programs. Foster relationships with regional birding clubs, the Hyde County government, and local civic organizations. Develop refuge Friends Group.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Special Events	No activity.	Conduct one program annually to celebrate National Wildlife Refuge Week, National Fishing Week, or International Migratory Bird Day. Serve as host to and assist with a Nature Week sponsored by the Hyde County Extension Service, or host an Environmental Field Day sponsored by the Hyde County Soil and Water Conservation District annually. Organize and conduct a "Refuge Workday" enlisting volunteer support.	Conduct two programs annually to celebrate National Wildlife Refuge Week, National Fishing Week, and/or International Migratory Bird Day. Host tours during Wings over Water Festival annually. Assist with Fish and Wildlife Service staffing of State Fair exhibit annually. Serve as host to and assist with a Nature Week sponsored by the Hyde County Extension Service, or host an Environmental Field Day sponsored by the Hyde County Soil and Water Conservation District annually. Organize and conduct a "Refuge Workday" enlisting volunteer support.
Visitor Protection	Provide visible law enforcement presence on the refuge by staff from Mattamuskeet NWR. Identify safety hazards and ensure the safety of visitors by eliminating hazards; and controlling access into hazardous areas.	Provide visible law enforcement presence on the refuge by staff from Mattamuskeet NWR. Identify safety hazards and ensure the safety of visitors by eliminating hazards; and controlling access into hazardous areas. Make information available to refuge visitors regarding refuge regulations and safety precautions.	Provide visible law enforcement presence on the refuge by staff from Mattamuskeet NWR. Staff dedicated to the refuge will assist with the identification of hazards. Identify safety hazards and ensure the safety of visitors by eliminating hazards; and controlling access into hazardous areas. Make information available to refuge visitors regarding refuge regulations and safety precautions.
Volunteer Program	Accept volunteers as they offer to serve.	Utilize and administer 300 hours of volunteer service to assist the staff in conducting refuge activities annually.	Utilize and administer 1000 hours of volunteer service to assist the staff in conducting refuge activities annually. Host one or two interns annually.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Wildlife Observation	Facilitate wildlife observation opportunities on the refuge. Maintain the Bell Island Pier annually, or as needed.	Facilitate wildlife observation opportunities on the refuge. Maintain the Bell Island Pier annually, or as needed. Develop and maintain one interpretative trail or boardwalk within ten years of plan approval. Provide wildlife list. Provide signage and observation binoculars at the Pier within ten years of plan approval. Develop a canoe trail within fifteen years of plan approval and maintain the canoe trail annually.	Facilitate wildlife observation opportunities on the refuge. Maintain the Bell Island Pier annually, or as needed. Develop and maintain one interpretative trail or boardwalk within five years of plan approval. Provide signage and observation binoculars at the Pier within five years of plan approval. Develop a canoe trail within fifteen years of plan approval and maintain the canoe trail annually. Provide wildlife list. Maintain a record of unusual wildlife observations.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Wildlife Photography	Facilitate wildlife photography opportunities on the refuge. Maintain the Bell Island Pier annually. Evaluate special access under permitted conditions to commercial and educational photographers.	Facilitate wildlife photography opportunities on the refuge. Maintain the Bell Island Pier annually, or as needed. Develop and maintain one interpretative trail or boardwalk within ten years of plan approval. Evaluate special access under permitted conditions to commercial and educational photographers.	Facilitate wildlife photography opportunities on the refuge. Maintain the Bell Island Pier annually, or as needed. Develop and maintain one interpretative trail or boardwalk within five years of plan approval. Construct a photo blind. Evaluate special access under permitted conditions to commercial and educational photographers.

Comparison of Alternatives by Management Program or Issue for Swanquarter National Wildlife Refuge			
Wildlife			
Program or Issue	Alternative A (Current Management – No Action Alternative)	Alternative B (Moderately Expand Programs – Proposed Alternative)	Alternative C (Optimally Expand Programs)
Staffing			
Staffing	9 FTE Assigned to Mattamuskeet Refuge Complex and Available to Share with Swanquarter Refuge: 1. Manager 2. Assistant Manager 3. Administrative Office Assistant 4. Park Ranger (Law Enforcement) 5. Heavy Mobile Equipment Mechanic 6. Heavy Equipment Operator 7. Maintenance Worker 8. Forestry Technician (Firefighter) 9. Maintenance Worker (Dedicated to Cedar Island)	13 FTE Assigned to Mattamuskeet Refuge Complex and Available to Share with Swanquarter Refuge: 1. Manager 2. Assistant Manager - Primary 3. Assistant Manager - Secondary 4. Wildlife Biologist 5. Administrative Office Assistant 6. Park Ranger (Law Enforcement) 7. Park Ranger (Public Use) 8. Heavy Mobile Equipment Mechanic 9. Heavy Equipment Operator 10. Maintenance Worker 11. Maintenance Worker 12. Forestry Technician (Firefighter) 13. Maintenance Worker (Dedicated to Cedar Island)	15.5 FTE Assigned to Mattamuskeet Refuge Complex and Available to Share with Swanquarter Refuge: 1. Manager 2. Assistant Manager - Primary 3. Assistant Manager - Secondary 4. Wildlife Biologist 5. Biological Technician 6. Administrative Office Assistant 7. Office Clerk (half time) 8. Park Ranger (Law Enforcement) 9. Park Ranger (Public Use) 10. Heavy Mobile Equipment Mechanic 11. Heavy Equipment Operator 12. Heavy Equipment Operator 13. Maintenance Worker 14. Maintenance Worker 15. Forestry Technician (Firefighter) 16. Maintenance Worker (Dedicated to Cedar Island)

IV. Environmental Consequences

OVERVIEW

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

EFFECTS COMMON TO ALL ALTERNATIVES

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

ENVIRONMENTAL JUSTICE

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

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

CLIMATE CHANGE

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

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

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

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

OTHER MANAGEMENT

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

LAND ACQUISITION

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

CULTURAL RESOURCES

All alternatives afford additional land protection and low levels of development, thereby producing little negative effect on the refuge's cultural and 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 North Carolina 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.

REFUGE REVENUE-SHARING

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

OTHER EFFECTS

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

SUMMARY OF EFFECTS BY ALTERNATIVE

This section describes the potential environmental consequences of adopting each refuge management alternative. The planning team selected the following impact topics for analysis: effects on the biological environment, effects on the physical environment, effects on the social environment, and effects on the economic environment. They chose these topics based on the important issues and concerns raised at the public scoping meeting and the planning team meetings. Each alternative portrays the expected outcomes for fish and wildlife species through the next 15 years, varying with the intensity of management. Table 20 outlines a comparison of the effects of Alternatives B and C to the existing condition (Alternative A).

BIOLOGICAL ENVIRONMENT

Each alternative would protect existing habitat important to migratory birds, mammals, reptiles, amphibians, fish, and invertebrates. Alternative B would provide data on more species on the refuge and control of more invasive weeds than Alternative A. Alternative C would provide data on all species on the refuge and control of more invasive weeds than Alternative B.

The increased public use provided in Alternatives B and C could adversely affect the refuge's wildlife populations due to disturbance and habitat trampling. Hunting is a dispersed activity and the effects of a small number of hunters would be spread over 6,000 acres identified for waterfowl hunting and over the upland portions of the refuge for deer hunting. The other activities would be concentrated on the Bell Island Pier, the new interpretive trail or boardwalk, and the roads. However, nesting and foraging habitat for waterfowl, marshbirds, wading birds, songbirds, and mammals would improve under Alternatives B and C because of the improved marsh management. Populations of all wildlife species would increase slightly under Alternative C.

Each alternative would protect sites important to migrating waterfowl, shorebirds, wading birds, and land birds. Alternatives B and C have the potential to provide better habitat than Alternative A.

The deer population on the refuge is currently at a healthy carrying capacity. Under Alternatives B and C, habitat management actions could increase the deer population slightly. The refuge's natural habitats provide a relatively poor source of forage for deer. Under Alternatives B and C, the staff would monitor deer populations and use hunting to manage their populations 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 negative effects to other wildlife species and habitat. Waterfowl management would also be carefully balanced to meet the needs of the waterfowl as well as the hunters.

The staff would develop an integrated pest management plan under Alternatives B and C. Whenever possible, all alternatives would consider techniques other than pesticides to control these species. However, the staff would use some quantity of pesticides on an as needed basis.

If the Service approves a Land Protection Plan and expanded acquisition boundary (expanded by less than 10 percent of the current refuge area), Alternatives B and C would provide additional protection to wetlands beyond the protection afforded by existing wetland regulations. They would also protect landscape characteristics, such as habitat connectivity, and would provide sufficient proprietary interest in properties to restore habitats for wildlife.

Under all public use alternatives, the plan would concentrate the level of recreation use and ground-based disturbance from pedestrians on Bell Island Pier and the interpretive trail or boardwalk. Despite this and dispersed activities, including hunting, public use could still have a negative effect on wildlife populations.

PHYSICAL ENVIRONMENT

A critical issue on the refuge is the water quality in the Pamlico Sound and the streams, bays, and ditches around it. Non-point pollution has caused a decrease in water quality over the years. Submerged aquatic vegetation has also decreased due to the decreased lower water quality as well as disturbance from some types of commercial fishing practices. The submerged aquatic vegetation provides the food for the fish and diving ducks that made Hyde County an outstanding waterfowl and fish production areas.

None of the alternatives in this CCP would affect the water quality from sources off the refuge except through education and outreach efforts. All the alternatives would mandate the management of the refuge to minimize water pollution.

All alternatives would have no adverse effect on soil formation processes on lands the refuge acquires by maintaining perennial natural vegetation on most of the refuge's area. Some disturbances to surface soils and topography would occur at those locations selected for public use facilities, maintenance operations, and habitat management.

All alternatives would have no adverse effect on the water quality in individual streams and wetlands due to a relatively low level of soil disturbance and pesticide application. 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 natural habitats. The staff would carry out habitat management activities designed to improve habitat composition and structure in such a way to minimize any short- term adverse aesthetic effects.

SOCIAL ENVIRONMENT

Alternative A provides recreation opportunities for the six priority public uses (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation). The NCWRC sets statewide seasons and bag limits for hunting and fishing. The refuge permits waterfowl

hunting on a portion of the refuge. The refuge has a 27,082-acre proclamation boundary encompassing waters of Pamlico Sound adjacent to refuge lands that is closed to waterfowl hunting. The refuge provides fishing opportunities on the Bell Island Pier and along the shoreline of the Pamlico Sound and banks of ditches and streams. The refuge staff does not plan for the other priority public uses, but does accommodate requests for access and programs. The staff does not conduct planned environmental education programs, but does conduct programs when teachers request them and allows the refuge to be used as an outdoor classroom and research site. It also maintains a 2-mile access road to a 1,000-foot fishing pier and a two mile service road.

Under Alternatives B and C, opportunities for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation would increase. Alternatives B and C would also stimulate eco-tourism and potentially increase tourism expenditures in the surrounding local communities. Alternative C would provide substantially more opportunities for all public uses than Alternative B.

All alternatives would allow public access by vehicle, foot, canoe, kayak, and bicycle to facilitate compatible wildlife-dependent recreation. Under Alternatives B and C, the Service would construct an interpretive trail or boardwalk, and under Alternative C a canoe trail would be developed. The refuge staff would develop more education and interpretive programs and tours. Alternative C would provide programs for more visitors than Alternative B.

Alternative B would allow deer hunting with archery equipment. Alternative C would allow deer hunting with archery equipment and primitive firearms. Alternatives B and C would provide more opportunities than Alternative A.

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 one habitat to another depending on its size, habitat type(s), and wildlife uses. Because much of the land in the area is currently in private ownership, the general public realizes only minimal access privileges on that land. Since the refuge is held in the public trust, it represents opportunities for public access to natural habitats.

ECONOMIC ENVIRONMENT

The wildlife-dependent recreational activities described under Alternatives B and C (i.e., expanded opportunities for hunting, fishing, wildlife observation, wildlife 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 53,000 refuge visits were reported in 2003 before Hurricane Isabel destroyed the Bell Island Pier.

Refuge visitation to support priority public uses would generally build over time as the staff develops visitor service programs and facilities and the Service provides operational funds. Initially, much of the public use on the refuge is expected to come from local, county, and state residents, and tourists visiting the area for another purpose. An increase in the number of spring and fall tourists would be predicted for hiking and wildlife observation and photography. The number of visitors would depend on the season and would grow if the refuge land base increases or more public use programs are provided. Programs developed for school children would involve children coming to the refuge to gain an awareness of the refuge's wildlife and habitats. It could also involve refuge personnel presenting programs concerning the refuge to area schools.

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 and wildlife observation as important tourist attractions. Under Alternatives B and C, development of wildlife-dependent recreation programs and facilities and improved publicity would lead to greater economic benefit from increased tourism. Alternative B would provide programming for 60,000 visitors; Alternative C would provide programming for 67,000 visitors.

The current 53,000 visitors spend an estimated $5,300,000 on the area economy assuming an expenditure of $100 per visitor day (Vogelsang 2001). The 60,000 visitors in Alternative B would represent an additional $700,000; the 67,000 visitors in Alternative C would represent an additional $1,400,000.

Land acquisition within an expanded approved acquisition boundary would decrease the gross property tax revenues of Hyde County. 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 would make annual payments to the counties 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 is greatest: (1) three-fourths of 1 percent of the fair market value of the lands acquired in fee title; (2) 25 percent of the net refuge receipts collected; or (3) 75 cents per acre of the lands acquired in fee title within the counties. 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 2004, Hyde County received a revenue-sharing payment of $6,589 for 16,411 acres with an appraised value of $1,885,300 at Swanquarter NWR. This was 47 percent of the amount due to the county under the Revenue Sharing Act, as Congress did not appropriate sufficient funding to pay the full amount. If fully funded, revenue sharing would have paid $14,140 to Hyde County.

The State of North Carolina recommends that counties tax undeveloped land based on the present use of the land. The state publishes a use-value manual based on the area of the state (Major Land Resource Area or MLRA) and the soil series of the land. Swanquarter NWR is in the Tidewater Area (MLRA 153B).

In Hyde County, the refuge has 700 acres of Class I soils in natural vegetation, 200 acres of Class III soils in natural vegetation, 3,100 acres of Class V soils in natural vegetation, and 12,411 acres of Class VI soils in natural vegetation (Table 19). The Hyde County tax rate is $.95 per $100 of assessed value. The county would have taxed $1,013,440 of assessed value; $9,628 if the 16,411 acres ($0.59 per acre) of land were privately owned. The revenue-sharing payment was $6,589 ($.40 per acre), .68 percent of the amount the state recommends for taxes.

UNAVOIDABLE IMPACTS AND MITIGATION MEASURES

Under Alternative A—the no-action alternative—there are numerous unavoidable impacts, including law enforcement, that are not adequate for ensuring safety and enforcing refuge regulations due to lack of staff availability; degradation of the biological functions of native plant communities and wildlife habitat due to the invasion of exotic plants and nuisance animals; and a decrease in biodiversity due to less active management of wildlife and habitat. If these issues are not addressed over time, they will continue to impact refuge resources.

Table 19. North Carolina present use value calculation

Series	Approximate Acreage	Class	Value/Acre	Total Value
Roper	200	I (Forestry)		
Hyde	50	I (Forestry)		
Yonges	50	I (Forestry)		
Brookman	200	I (Forestry)		
Argent	200	I (Forestry)		
Total	**700**	**I (Forestry)**	**$440**	**$308,000**
Stockade	200	III (Forestry)		
Total	**200**	**III (Forestry)**	**$115**	**$23,000**
Belhaven	1,300	V (Forestry)		
Pungo	1,200	V (Forestry)		
Scuppernong	500	V (Forestry)		
Dorovan	100	V (Forestry)		
Total	**3,100**	**V (Forestry)**	**$60**	**$186,000**
Longshoal	7,900	VI		
Delway	3,000	VI		
Backbay	1,500	VI		
Udorthents	11	VI		
Total	**12,411**	**VI**	**$40**	**$496,440**
Grand Total	**16,411**			**$1,013,440**

Table 20. A comparison of the effects of Alternatives B and C to Alternative A

Area of Concern	Alternative B	Alternative C
Wildlife		
Fish Population	No Difference	No Difference
Invertebrate Population	No Difference	No Difference
Land Bird Population	No Difference	Slight Increase
Mammal Population	No Difference	Slight Increase
Marsh Bird Population	No Difference	Slight Increase
Reptile and Amphibian Population	No Difference	No Difference
Shorebird Population	No Difference	Slight Increase
Wading Bird Population	No Difference	Slight Increase
Waterfowl Population	No Difference	Slight Increase
Wildlife Habitat		
Administrative Areas	No Difference	No Difference
Brackish Marsh	Slight Improvement	Slight Improvement
Cypress-Gum Swamp Condition	No Difference	No Difference
Estuarine Fringe Loblolly Pine Forest	No Difference	No Difference
High Pocosin	No Difference	No Difference
Mixed Pine Hardwood Forest Condition	No Difference	No Difference
Threatened and Endangered Species Condition	No Difference	No Difference
Pest Animal Populations	Slight Decrease	Slight Decrease
Pest Plant Populations	Slight Decrease	Moderate Decrease
Natural Heritage Area Condition	No Difference	No Difference
Wildlife Disease Level	No Difference	No Difference
Effect on Social Environment:		
Hunting	Slight Improvement	Moderate Improvement
Fishing	Slight Improvement	Moderate Improvement
Environmental Education	Slight Improvement	Moderate Improvement
Interpretation	Slight Improvement	Moderate Improvement
Wildlife Observation	Slight Improvement	Moderate Improvement
Wildlife Photography	Slight Improvement	Moderate Improvement
Outreach	Slight Improvement	Moderate Improvement
Cultural Resources	No Difference	No Difference
Effect on Physical Environment		
Water Quality	No Difference	No Difference
Soil Quality	No Difference	No Difference
Air Quality	No Difference	No Difference
Visual Quality	No Difference	No Difference
Effect on Economic Environment		
Local Expenditures	Slight Increase	Moderate Increase
Local Property Taxes	Slight Decrease	Slight Decrease

Alternative B, the proposed alternative, also has some unavoidable impacts. These impacts are expected to be minor and/or short-term in duration. However, the refuge would attempt to minimize these impacts whenever possible. The following sections describe the measures the refuge would employ to mitigate and minimize the potential impacts that would result from implementation of the proposed alternative.

WATER QUALITY FROM SOIL DISTURBANCE AND USE OF HERBICIDES

Soil disturbance and siltation due to water management activities; road and ditch maintenance; and the construction of an interpretive trail or boardwalk, and other facilities would be expected to be minor and of short duration. To further reduce potential impacts, the refuge would use best management practices to minimize the erosion of soils into water bodies.

Foot traffic on new and extended foot trails would be expected to have a negligible impact on soil erosion. To minimize the impacts from public use, the refuge would include informational signs that request trail users to remain on the trails in order to avoid causing potential erosion problems.

Long-term herbicide use for exotic plant control could result in a slight decrease in water quality in areas prone to exotic plant infestation. Through the proper application of herbicides, however, this would be expected to have a minor impact on the environment, with the benefit of reducing or eliminating exotic plant infestations.

WILDLIFE DISTURBANCE

Disturbance to wildlife is an unavoidable consequence of any public use program, regardless of the activity involved. While some activities, such as wildlife observation, may be less disturbing than others, all of the public use activities proposed under the proposed alternative would be planned to avoid unacceptable levels of impact.

The known and anticipated levels of disturbance from the proposed alternative are not considered to be significant. Nevertheless, the refuge would manage public use activities to reduce impacts. Providing access for fishing opportunities allows the use of a renewable natural resource without adversely impacting other resources. Hunting would also be managed with restrictions that ensure minimal impact on other resources. General wildlife observation could result in minimal disturbance to wildlife. If the refuge determines that impacts from the expected additional visitor uses are above the levels that are anticipated, those uses would be discontinued, restricted, or rerouted to other less sensitive areas.

VEGETATION DISTURBANCE

Negative impacts could result from the creation, extension, and maintenance of trails that require the clearing of nonsensitive vegetation along their length. This is expected to be a minor short-term impact.

Increased visitor use may increase the potential for the introduction of new exotic species into areas when visitors do not comply with boating regulations at the boat ramps and other access points, or with requests to stay on trails. The refuge would minimize this impact by enforcing the regulations for access to the refuge's water bodies, and by installing informational signs that request users to stay on the trails.

USER GROUP CONFLICTS

As public use increases, unanticipated conflicts between different user groups could occur. If this should happen, the refuge would adjust its programs, as needed, to eliminate or minimize any public use issues. The refuge would use methods that have proven to be effective in reducing or eliminating public use conflicts. These methods include establishing separate use areas, different use periods, and limits on the numbers of users in order to provide safe, quality, appropriate, and compatible wildlife-dependent recreational opportunities.

EFFECTS ON ADJACENT LANDOWNERS

Implementation of the proposed alternative is not expected to negatively affect the owners of private lands adjacent to the refuge. Positive impacts that would be expected include higher property values, less intrusion of invasive exotic plants, and increased opportunities for viewing more diverse wildlife.

However, some negative impacts that may occur include a higher frequency of trespass onto adjacent private lands, and noise associated with increased traffic. To minimize these potential impacts, the refuge would provide informational signs that clearly mark refuge boundaries; maintain the refuge's existing parking facilities; use law enforcement; and provide increased educational efforts.

LAND OWNERSHIP AND SITE DEVELOPMENT

Land acquisition efforts by the Service could lead to changes in land use and recreational use patterns. However, most of the non-Service-owned lands near the refuge are currently undeveloped. If these lands are acquired as additions to the refuge, they would be maintained in a natural state, managed for native wildlife populations, and opened to wildlife-dependent public uses, where feasible.

Potential development of an interpretive trail or boardwalk and other improvements could lead to minor short-term negative impacts on plants, soils, and some wildlife species. Efforts would be made to use recycled products and environmentally sensitive treated lumber for any construction project. All construction activities would comply with the requirements of Section 404 of the Clean Water Act; the National Historic Preservation Act; Executive Order 11988, Floodplain Management; and other applicable regulatory requirements.

CUMULATIVE IMPACTS

A cumulative impact is defined as an impact on the natural or human environment, which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7).

Cumulative impacts are the overall, net effects on a resource that arise from multiple actions. Impacts can "accumulate" spatially, when different actions affect different areas of the same resource. They can also accumulate over the course of time, from actions in the past, the present, and the future. Occasionally, different actions counterbalance one another, partially canceling out each other's effect on a resource. But more typically, multiple effects add up, with each additional action contributing an incremental impact on the resource. In addition, sometimes the overall effect is greater than merely the sum of the individual effects, such as when one more reduction in a population crosses a threshold of reproductive sustainability, and threatens to extinguish the population.

A thorough analysis of impacts always considers their cumulative aspects, because actions do not take place in a vacuum: there are virtually always some other actions that have affected that resource in some way in the past, or are affecting it in the present, or would affect it in the reasonably foreseeable future. So any assessment of a specific action's effects must in fact be made with consideration of what else has happened to that resource, what else is happening, or what else would likely happen to it.

The refuge is not aware of any past, present, or future planned actions that would result in a significant cumulative impact when added to the refuge's proposed actions, as outlined in the proposed alternative.

Nevertheless, because of concerns expressed about the cumulative effects of hunting on certain national wildlife refuges, the potential cumulative impacts of the hunting program at Swanquarter NWR will be analyzed.

Waterfowl

Wildlife disturbance associated with waterfowl hunting has a negative impact on diurnal and nocturnal use of an area by waterfowl (Cronan 1957; McNeil et al., 1992; Paulus 1984), and over-hunting could have a negative impact on the waterfowl population. However, at Swanquarter NWR waterfowl hunting is only allowed on a 6,120-acre-area of marsh, which includes Great Island and portions of the marshes just north of Great Island bordering Juniper Bay. Hunting is not allowed within the 27,000 acres of adjacent waters within the Presidential Proclamation Area. Waterfowl can utilize the Presidential Proclamation Area for resting and feeding while adjacent areas are hunted. In addition, public waterfowl hunting provides an economical means for statistical data collection. Random checks of hunters can provide kill ratio, population composition, and bird habitat data, as well as the possibility of organ collection (e.g., gizzards) for various studies.

The Fish and Wildlife Service annually prescribes frameworks, or outer limits, for dates and times when hunting may occur and the number of birds that may be taken and possessed. These frameworks are necessary to allow State selections of season and limits for recreation and sustenance; aid federal, state, and tribal governments in the management of migratory game birds; and permit harvests at levels compatible with population status and habitat conditions. Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 CFR Part 20) establishing the frameworks from which States may select season dates, bag limits, shooting hours, and other options for each migratory bird hunting season. Thus, in effect, federal annual regulations both allow and limit the hunting of migratory birds. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four flyways for the primary purpose of managing migratory game birds. Each flyway (e.g., Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each state and province in that flyway. Swanquarter NWR is within the Atlantic Flyway. Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of status reports and presentations to flyway councils and other interested parties to ensure the best decisions regarding hunting programs could be made. The Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. Mitigation measures, such as afternoon closure of hunting, or reducing the total take of waterfowl, would be implemented to minimize negative impacts to the waterfowl population as needed. With proper management and cooperation between the Service and the states, waterfowl hunting would not cause a significant negative impact at Swanquarter NWR.

Deer

Home range size in mammals often decreases as population density increases (Sanderson 1966). Bridges (1968) and Smith (1970) both observed a threefold increase in home-range size following a die-off in a Florida deer population. Adult bucks generally have larger home ranges than does, and these ranges can vary in size due to many environmental factors. In Florida, minimum home ranges averaged 1,539 acres for two mature bucks, 606 acres for two does, and 378 acres for a buck fawn (Smith 1970). Deer hunting at Swanquarter NWR, therefore, would be expected to have only local impacts on the population due to restricted home ranges of white-tailed deer.

Hunters make extensive use of the area around the refuge for deer hunting. White-tailed deer are considered to be browsers because they primarily consume woody vegetation. However, white-tailed deer will eat almost any available form of plant life. Because of this adaptability, it is impossible to single out one habitat as greatly superior to others. Interaction of deer and habitat is a combination of food preference and utilization, quantity and quality of food, and availability of cover (Halls 1984, Halls and Ripley 1961). However, best estimates suggest a much lower carrying capacity for pocosin habitat than other habitat types. For example, Monschein (1981) reported the best estimate for pocosin habitat is about 6 deer per-square-mile; about 18 deer per-square-mile along pocosin borders; and 35-40 deer per-square-mile for coastal bottomland hardwoods. Basic differences involve the quantity, quality, and availability of food.

Since establishment of the refuges on the Albemarle-Pamlico Peninsula, periodic abomasal parasite counts, necropsy findings, laboratory tests, and general physical condition indicate that the health of the deer population is fair to good. It was concluded in 1985, 1992, and 1998, by the Southeastern Cooperative Wildlife Study that Swanquarter deer were within an optimal stocking density for the nutritional capacity of the habitat.

Under Alternatives B and C, habitat management actions could increase the deer population slightly. The refuge's natural habitats provide a relatively poor source of forage for deer. Under Alternatives B and C, the staff would monitor deer populations and use hunting to manage their populations 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. With proper management, deer hunting could maintain herd health and protect habitat at the refuge.

DIRECT AND INDIRECT EFFECTS OR IMPACTS

Direct effects are caused by an action and occur at the same time as the action. Indirect effects are caused by an action but are manifested later in time or further removed in distance, but still reasonably foreseeable.

The actions proposed for implementation under the proposed alternative include facility development, wildlife and population management, resource protection, public use, and administrative programs. These actions would result in both direct and indirect effects. Facility development, for example, would most likely lead to increased public use, a direct effect; and it, in turn, would lead to indirect effects, such as increased littering, noise, and vehicular traffic.

Other indirect effects that may result from implementing the proposed alternative include minor impacts from siltation due to the disturbance of soils and vegetation while expanding or creating new foot trails; and construction of a boardwalk and/or interpretive display at the refuge.

Anticipated indirect effects or impacts are thought to be minimal and/or short-term issues. Best management practice during construction of facilities, proper management of the refuge, and education of the public would deter impacts. As issues arise, the Service would also utilize adaptive management to minimize negative impacts.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

The habitat protection and management actions proposed under the proposed alternative are dedicated to maintaining the long-term productivity of refuge habitats. The benefits of this plan for long-term productivity far outweigh any impacts from short-term actions, such as the construction of a boardwalk and/or interpretive display, or creation of new trails. While these activities would cause short-term negative impacts, the educational values and associated public support gained from the improved visitor experience would produce long-term benefits for the refuge's entire ecosystem.

The key to protecting and ensuring the refuge's long-term productivity is to find the threshold where public uses do not degrade or interfere with the refuge's natural resources. The plans proposed under the proposed alternative have been carefully conceived to achieve that threshold. Therefore, implementing the proposed alternative would lead to long-term benefits for wildlife protection and land conservation that far outweigh any short-term impacts.

V. Consultation and Coordination

OVERVIEW

This chapter summarizes the consultation and coordination that has occurred to date in identifying the issues, alternatives, and proposed alternative, which are presented in this Draft CCP/EA. It lists the meetings that have been held with the various agencies, organizations, and individuals who were consulted in the preparation of the Draft CCP/EA.

The Service formed a planning core team composed of representatives from various Service divisions to prepare the Draft CCP/EA (Table 21). Initially, the team focused on identifying the issues and concerns pertinent to refuge management. The team met on several occasions from December 2000 to June 2002. A biological review team (Table 22) met on the refuges in the ecosystem four times between December 1999 and December 2000 to assess the habitats on the refuges and the needs of wildlife species in the ecosystem, and to make recommendations on land management and acquisition needs. The core team also sought the contributions of experts (Table 23) from various fields.

Table 21. Swanquarter NWR comprehensive conservation core planning team members

Name and Title	Station, Refuge, Location
Bruce Freske, Refuge Manager Jerry Fringeli, Assistant Manager Chris Smith, Law Enforcement Officer Don Temple, Former Manager John Stanton, Former Wildlife Biologist Dan Sheill, Former Law Enforcement Officer	Mattamuskeet National Wildlife Refuge U.S. Fish and Wildlife Refuge Swan Quarter, North Carolina
Robert Glennon, Former Natural Resource Planner David Brown, Former Habitat Protection Biologist	Former Ecosystem Planning Office U.S. Fish and Wildlife Service Edenton, North Carolina

Table 22. Swanquarter NWR comprehensive conservation biological review team members

Name and Title	Station, Refuge, Location
Bob Noffsinger, Former Supervisory Wildlife Management Biologist	Migratory Bird Field Office U.S. Fish and Wildlife Service Manteo, North Carolina
Frank Bowers, Former Migratory Bird Coordinator	Southeast Regional Office U.S. Fish and Wildlife Service Atlanta, Georgia
Chuck Hunter, Former Nongame Migratory Bird Coordinator	Southeast Regional Office U.S. Fish and Wildlife Service Atlanta, Georgia
Ronnie Smith, Fisheries Biologist	Fisheries Assistance Office U.S. Fish and Wildlife Service Edenton, North Carolina
John Stanton, Former Wildlife Biologist	Mattamuskeet National Wildlife Refuge U.S. Fish and Wildlife Service Swan Quarter, North Carolina
Wendy Stanton, Wildlife Biologist	Pocosin Lakes National Wildlife Refuge U.S. Fish and Wildlife Service Columbia, North Carolina
Dennis Stewart, Wildlife Biologist	Alligator River National Wildlife Refuge U.S. Fish and Wildlife Service Manteo, North Carolina
Ralph Keel, Former Wildlife Biologist	Great Dismal Swamp National Wildlife Refuge U.S. Fish and Wildlife Service Suffolk, Virginia
John Gallegos, Wildlife Biologist	Back Bay National Wildlife Refuge U.S. Fish and Wildlife Service Virginia Beach, Virginia
David Allen, Nongame Wildlife Biologist	North Carolina Wildlife Resources Commission New Bern, North Carolina

Table 23. Expert contributors to the Swanquarter NWR comprehensive conservation plan and their area(s) of expertise

Expert	Area of Expertise
Bill Grabill, Former Refuge Supervisor U.S. Fish and Wildlife Service Atlanta, Georgia	Refuge Management
Rufus Croom, District Conservationist USDA, Natural Resources Conservation Service Plymouth, North Carolina	Soil and Water Conservation Federal Land Conservation Programs
John Gagnon, Soil Scientist USDA, Natural Resources Conservation Service Edenton, North Carolina	Soil Science
Kevin Moody, Former NEPA Specialist U.S. Fish and Wildlife Service Atlanta, Georgia	National Environmental Policy Act
John Ann Shearer, Private Lands Biologist U.S. Fish and Wildlife Service Raleigh, North Carolina	Wetland Management Partners for Fish and Wildlife Program
Richard Kanaski, Regional Archaeologist U.S. Fish and Wildlife Service Savannah, Georgia	Cultural Resources

To expand the range of issues and to generate potential alternatives, the core planning team (Table 21) met in January 2001. Shortly thereafter, on February 15, 16, 20, 22, and 23 in Washington, Swan Quarter, Plymouth, Columbia, and Manns Harbor, the planning team held public meetings to gain the insights of local citizens and their perceptions of the issues and concerns facing the refuge.

The issues and alternatives generated from these meetings, coupled with the input of the planning team, are summarized in Chapters 1 and 3 of this environmental impact statement.

Appendix A. Glossary

Adaptive Management: Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in a management plan. Analysis of results helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Alluvial: Sediment transported and deposited in a delta or riverbed by flowing water.

Alternative: 1. A reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2). 2. Alternatives are different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission, and resolving issues (Service Manual 602 FW 1.6B).

Anadromous: Migratory fishes that spend most of their lives in the sea and migrate to fresh water to breed.

Approved Acquisition Boundary: A project boundary that the Director of the Fish and Wildlife Service approves upon completion of the detailed planning and environmental compliance process.

Biological Diversity: The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (Service Manual 052 FW 1. 12B). The System's focus is on indigenous species, biotic communities, and ecological processes. Also referred to as biodiversity.

Biological Integrity: The biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities.

Canopy: A layer of foliage; generally the upper-most layer, in a forest stand. It can be used to refer to mid- or under-story vegetation in multi-layered stands. Canopy closure is an estimate of the amount of overhead tree cover (also canopy cover).

Carrying Capacity: The maximum population of a species able to be supported by a habitat or area.

Categorical Exclusion: A category of actions that does not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).

CFR: Code of Federal Regulations.

Compatible Use: A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purpose(s) of the national wildlife refuge [50 CFR 25.12 (a)]. A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan: A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purposes of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System; and meets other mandates (Service Manual 602 FW 1.6 E).

Concern: See Issue

Conservation Easement: A legal document that provides specific land-use rights to a secondary party. A perpetual conservation easement usually grants conservation and management rights to a party in perpetuity.

Cooperative Agreement: A simple habitat protection action in which no property rights are acquired. An agreement is usually long-term and can be modified by either party. Lands under a cooperative agreement do not necessarily become part of the National Wildlife Refuge System.

Corridor: A route that allows movement of individuals from one region or place to another.

Cover Type: The present vegetation of an area.

Cultural Resource Inventory: A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).

Cultural Resource Overview:	A comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field office's background or literature search described in Section VIII of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7).
Cultural Resources:	The remains of sites, structures, or objects used by people in the past.
Cypress and Tupelo Swamp:	Found in low-lying areas, swales, and open ponds that hold water several months, if not all of the year. Large hollow trees are used as bear den sites.
Deciduous:	Pertaining to perennial plants that are leafless for some time during the year.
Designated Wilderness Area:	An area designated by the U.S. Congress to be managed as part of the National Wilderness Preservation System (Draft Service Manual 610 FW 1.5).
Disturbance:	Significant alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., aircraft overflight).
Ecological Succession:	The orderly progression of an area through time in the absence of disturbance from one vegetative community to another.
Ecosystem:	A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.
Ecosystem Management:	Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.
Endangered Species (Federal):	A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.
Endangered Species (State):	A plant or animal species in danger of becoming extinct or extirpated in the state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.
Endemic Species:	Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.

Environmental Assessment (EA):	A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).
Environmental Health:	It is the composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment.
Environmental Impact Statement (EIS):	A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).
Estuary:	The wide lower course of a river into which the tides flow. The area where the tide meets a river current.
Even-Aged Forests:	Forests that are composed of trees with a time span of less than 20 years between oldest and youngest individuals.
Fauna:	All the vertebrate or invertebrate animals of an area.
Federal Trust Species:	All species where the Federal Government has primary jurisdiction including federally threatened or endangered species, migratory birds, anadromous fish, and certain marine mammals.
Fee-title:	The acquisition of most or all of the rights to a tract of land. There is a total transfer of property rights with the formal conveyance of a title. While a fee title acquisition involves most rights to a property, certain rights may be reserved or not purchased, including water rights, mineral rights, or use reservation (the ability to continue using the land for a specified time period, or the remainder of the owner's life).
Finding of No Significant Impact (FONSI):	A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).

Floodplain Woods:	Bottomland Hardwood Forests. Consists of hardwoods (old growth and mid-succession age timber) and cypress tupelo stands found on low ridges that drain slowly and are subject to flooding. Species include overcup, willow, water oaks, sweetgum, and green ash. Old growth—typically exceeding 120 years of age. Red oaks were removed in the 1940s. Mid-succession—logged timber that may need restoration to improve wildlife habitat. Missing several key oak species.
Fragmentation:	The process of reducing the size and connectivity of habitat patches. The disruption of extensive habitats into isolated and small patches.
Geographic Information System:	A computer system capable of storing and manipulating spatial data.
Goal:	Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Service Manual 620 FW 1.6J).
Ground Story (flora):	Vascular plants less than one meter in height, excluding tree seedlings.
Habitat:	Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.
Habitat Restoration:	Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy ecosystems.
Habitat Type:	See Vegetation Type.
Herbaceous Wetland:	Annually or seasonally inundated with vegetation consisting primarily of grasses, sedges, rushes, and cattail.
Historic Conditions:	These are the composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human related changes to the landscape.
Improvement Act:	The National Wildlife Refuge System Improvement Act of 1997.
Indicator Species:	A species of plant or animals that is assumed to be sensitive to habitat changes and represents the needs of a larger group of species.
Informed Consent:	The grudging willingness of opponents to “go along” with a course of action that they actually oppose (Bleiker).
In-holding:	Privately owned land inside the boundary of a national wildlife refuge.

Issue:	Any unsettled matter that requires a management decision [e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or other presence of an undesirable resource condition (Service Manual 602 FW 1.6K)].
Management Alternative:	See Alternative
Management Concern:	See Issue
Management Opportunity:	See Issue
Migration:	The seasonal movement from one area to another and back.
Mission Statement:	Succinct statement of the unit's purpose and reason for being.
Monitoring:	The process of collecting information to track changes of selected parameters over time.
National Environmental Policy Act of 1969 (NEPA):	Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (40 CFR 1500).
National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57):	Under the Refuge Improvement Act, the Fish and Wildlife Service is required to develop 15-year comprehensive conservation plans for all national wildlife refuges outside Alaska. The Act also describes the six public uses given priority status within the Refuge System (i.e., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation).
National Wildlife Refuge System Mission:	The mission is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.
National Wildlife Refuge System:	Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters, and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; game ranges; wildlife management areas; or waterfowl production areas.

National Wildlife Refuge:	A designated area of land, water, or an interest in land or water within the Refuge System.
Native Species:	Species that normally live and thrive in a particular ecosystem.
Neotropical Migratory Bird:	A bird species that breeds north of the United States/Mexican border and winters primarily south of that border.
Noxious Weed:	A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States. According to the Federal Noxious Weed Act (P.L. 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the Untied States and to the public health.
Objective:	A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Making objectives attainable, time-specific, and measurable (Service Manual 602 FW 1.6N).
Planning Area:	A planning area may include lands outside existing planning unit boundaries that are being studied for inclusion in the unit and/or partnership planning efforts. It may also include watersheds or ecosystems that affect the planning area.
Planning Team:	A planning team prepares the comprehensive conservation plan. Planning teams are interdisciplinary in membership and function. A team generally consists of the planning team leader; refuge manager and staff biologists; staff specialists or other representatives of Service programs, ecosystems or regional offices; and state partnering wildlife agencies as appropriate.
Plant Association:	A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.
Plant Community:	An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community.
Proposed Alternative:	This is the alternative determined (by the decision-maker) to best achieve the refuge purpose, vision, and goals; contributes to the Refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management.

Prescribed Fire: The application of fire to wildland fuels to achieve identified land use objectives (Service Manual 621 FW 1.7). May occur from natural ignition or intentional ignition.

Priority Species: Fish and wildlife species that require protective measures and/or management guidelines to ensure their perpetuation. Priority species include the following: (1) State-listed and candidate species; (2) species or groups of animals susceptible to significant population declines within a specific area or statewide by virtue of their inclination to aggregate (e.g., seabird colonies); and (3) species of recreation, commercial, and/or tribal importance.

Public Involvement Plan: Broad long-term guidance for involving the public in the comprehensive conservation planning process.

Public Involvement: A process that offers impacted and interested individuals and organizations an opportunity to become informed about, and to express their opinions on Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

Public: Individuals, organizations, and groups; officials of federal, state, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in service issues and those who do or do not realize that Service decisions may affect them.

Purposes of the Refuge: "The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge sub-unit." For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge (Service Manual 602 FW 106 S).

Recommended Wilderness: Areas studied and found suitable for wilderness designation by both the Director of the Fish and Wildlife Service and the Secretary of the Department of the Interior, and recommended for designation by the President to Congress. These areas await only legislative action by Congress in order to become part of the Wilderness System. Such areas are also referred to as "pending in Congress" (Draft Service Manual 610 FW 1.5).

Record of Decision (ROD):	A concise public record of decision prepared by the federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).
Refuge Goal:	See Goal
Refuge Operating Needs System:	This is a national database that contains the unfunded operational needs of each refuge. Projects included are those required to implement approved plans and meet goals, objectives, and legal mandates.
Refuge Purposes:	See Purposes of the Refuge
Seral Forest:	A forest in the mature stage of development, usually dominated by large, old trees.
Sink:	A habitat in which local mortality exceeds local reproductive success for a given species.
Sink Population:	A population in a low-quality habitat in which birth rate is generally less than the death rate and population density is maintained by immigrants from source populations.
Songbirds: (Also Passerines)	A category of birds that is medium to small, perching landbirds. Most are territorial singers and migratory.
Source:	A habitat in which local reproductive success exceeds local mortality for a given species.
Source Population:	A population in a high-quality habitat in which birth rate greatly exceeds death rate and the excess individuals leave as migrants.
Step-down Management Plan:	A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, and safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives (Service Manual 602 FW 1.6 U).
Strategy:	A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.6 U).

Study Area:	The area reviewed in detail for wildlife, habitat, and public use potential. For purposes of this CCP, the study area includes the lands within the currently approved refuge boundary and potential refuge expansion areas.
Threatened Species (Federal):	Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
Threatened Species (State):	A plant or animal species likely to become endangered in the state within the near future if factors contributing to population decline or habitat degradation or loss continue.
Tiering:	The coverage of general matters in broader environmental impact statements with subsequent narrower statements of environmental analysis, incorporating by reference, the general discussions and concentrating on specific issues (40 CFR 1508.28).
Trust Species:	Species for which the Fish and Wildlife Service has primary responsibility, including most federally listed threatened and endangered species, anadromous fish once they enter the inland coastal waterways, and migratory birds.
U.S. Fish and Wildlife Service Mission:	The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.
Understory:	Any vegetation with canopy below or closer to the ground than canopies of other plants.
Unit Objective:	See Objective
Vegetation Type, Habitat Type, Forest Cover Type:	A land classification system based upon the concept of distinct plant associations.
Vision Statement:	A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates. We will tie the vision statement for the refuge to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates (Service Manual 602 FW 1.6 Z).

Wilderness Study Areas: Lands and waters identified through inventory as meeting the definition of wilderness and undergoing evaluation for recommendation for inclusion in the Wilderness System. A study area must meet the following criteria:

- Generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- Has outstanding opportunities for solitude or a primitive and unconfined type of recreation; and
- Has at least 5,000 contiguous roadless acres or is sufficient in size as to make practicable its preservation and use in an unimpaired condition (Draft Service Manual 610 FW 1.5).

Wilderness: See Designated Wilderness

Wildfire: A free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands (Service Manual 621 FW 1.7).

Wildland Fire: Every wildland fire is either a wildfire or a prescribed fire (Service Manual 621 FW 1.3)

Wildlife Corridor: A landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat dedicated to conservation functions. Such corridors may facilitate several kinds of traffic, including frequent foraging movement, seasonal migration, or the once in a lifetime dispersal of juvenile animals. These are transition habitats and need not contain all habitat elements required by migrants for long-term survival or reproduction.

Wildlife-Dependent Recreation: A use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The National Wildlife Refuge System Improvement Act of 1997 specifies that these are the six priority general public uses of the system.

ACRONYMS AND ABBREVIATIONS

BCC Birds of Conservation Concern
BRT Biological Review Team
CCP Comprehensive Conservation Plan
CFR Code of Federal Regulations
cfs cubic feet per second
DOI Department of the Interior
DU Ducks Unlimited
EA Environmental Assessment
EE environmental education
EIS Environmental Impact Statement
EPA U.S. Environmental Protection Agency
ESA Endangered Species Act
FR Federal Register
FTE full-time equivalent
FY Fiscal Year
GIS Global Information System
NEPA National Environmental Policy Act
NRHP National Register of Historic Places
NWR National Wildlife Refuge
NWRS National Wildlife Refuge System
PFT Permanent Full Time
PUNA Public Use Natural Area
RM Refuge Manual
RNA Research Natural Area
ROD Record of Decision
RONS Refuge Operating Needs System
RRP Refuge Roads Program
FWS U.S. Fish and Wildlife Service (also Service)
TFT Temporary Full Time
USC United States Code

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Appendix C. Relevant Legal Mandates and Executive Orders

STATUE	DESCRIPTION
Administrative Procedures Act (1946)	Outlines administrative procedures to be followed by federal agencies with respect to identification of information to be made public; publication of material in the Federal Register; maintenance of records; attendance and notification requirements for specific meetings and hearings; issuance of licenses; and review of agency actions.
American Antiquities Act of 1906	Provides penalties for unauthorized collection, excavation, or destruction of historic or prehistoric ruins, monuments, or objects of antiquity on lands owned or controlled by the United States. The Act authorizes the President to designate as national monuments objects or areas of historic or scientific interest on lands owned or controlled by the Unites States.
American Indian Religious Freedom Act of 1978	Protects the inherent right of Native Americans to believe, express, and exercise their traditional religions, including access to important sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites.
Americans With Disabilities Act of 1990	Intended to prevent discrimination of and make American society more accessible to people with disabilities. The Act requires reasonable accommodations to be made in employment, public services, public accommodations, and telecommunications for persons with disabilities.
Anadromous Fish Conservation Act of 1965, as amended	Authorizes the Secretaries of Interior and Commerce to enter into cooperative agreements with states and other non-federal interests for conservation, development, and enhancement of anadromous fish and contribute up to 50 percent as the federal share of the cost of carrying out such agreements. Reclamation construction programs for water resource projects needed solely for such fish are also authorized.
Archaeological Resources Protection Act of 1979, as amended.	This Act strengthens and expands the protective provisions of the Antiquities Act of 1906 regarding archaeological resources. It also revised the permitting process for archaeological research.
Architectural Barriers Act of 1968	Requires that buildings and facilities designed, constructed, or altered with federal funds, or leased by a federal agency, must comply with standards for physical accessibility.
Bald and Golden Eagle Protection Act of 1940, as amended	Prohibits the possession, sale or transport of any bald or golden eagle, alive or dead, or part, nest, or egg except as permitted by the Secretary of the Interior for scientific or exhibition purposes, or for the religious purposes of Indians.

STATUE	DESCRIPTION
Bankhead-Jones Farm Tenant Act of 1937	Directs the Secretary of Agriculture to develop a program of land conservation and utilization in order to correct maladjustments in land use and thus assist in such things as control of soil erosion, reforestation, conservation of natural resources and protection of fish and wildlife. Some early refuges and hatcheries were established under authority of this Act.
Cave Resources Protection Act of 1988	Established requirements for the management and protection of caves and their resources on federal lands, including allowing the land managing agencies to withhold the location of caves from the public, and requiring permits for any removal or collecting activities in caves on federal lands.
Clean Air Act of 1970	Regulates air emissions from area, stationary, and mobile sources. This Act and its amendments charge federal land managers with direct responsibility to protect the "air quality and related values" of land under their control. These values include fish, wildlife, and their habitats.
Clean Water Act of 1974, as amended	This Act and its amendments have as its objective the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters. Section 401 of the Act requires that federally permitted activities comply with the Clean Water Act standards, state water quality laws, and any other appropriate state laws. Section 404 charges the U.S. Army Corps of Engineers with regulating discharge of dredge or fill materials into waters of the United States, including wetlands.
Coastal Barrier Resources Act of 1982 (CBRA)	Identifies undeveloped coastal barriers along the Atlantic and Gulf Coasts and included them in the John H. Chafee Coastal Barrier Resources System (CBRS). The objectives of the act are to minimize loss of human life, reduce wasteful federal expenditures, and minimize the damage to natural resources by restricting most federal expenditures that encourage development within the CBRS.
Coastal Barrier Improvement Act of 1990	Reauthorized the Coastal Barrier Resources Act (CBRA), expanded the CBRS to include undeveloped coastal barriers along the Great Lakes and in the Caribbean, and established "Otherwise Protected Areas (OPAs)." The Service is responsible for maintaining official maps, consulting with federal agencies that propose spending federal funds within the CBRS and OPAs, and making recommendations to Congress about proposed boundary revisions.
Coastal Wetlands Planning, Protection, and Restoration (1990)	Authorizes the Director of the Fish and Wildlife Service to participate in the development of a Louisiana coastal wetlands restoration program, participate in the development and oversight of a coastal wetlands conservation program, and lead in the implementation and administration of a national coastal wetlands grant program.

STATUE	DESCRIPTION
Coastal Zone Management Act of 1972, as amended	Established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans and requires that "any federal activity within or outside of the coastal zone that affects any land or water use or natural resource of the coastal zone" shall be "consistent to the maximum extent practicable with the enforceable policies" of a state's coastal zone management plan. The law includes an Enhancement Grants Program for protecting, restoring, or enhancing existing coastal wetlands or creating new coastal wetlands. It also established the National Estuarine Research Reserve System, guidelines for estuarine research, and financial assistance for land acquisition.
Emergency Wetlands Resources Act of 1986	This Act authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act requires the Secretary to establish a National Wetlands Priority Conservation Plan, required the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amounts equal to import duties on arms and ammunition. It also established entrance fees at national wildlife refuges.
Endangered Species Act of 1973, as amended	Provides for the conservation of threatened and endangered species of fish, wildlife, and plants by federal action and by encouraging the establishment of state programs. It provides for the determination and listing of threatened and endangered species and the designation of critical habitats. Section 7 requires refuge managers to perform internal consultation before initiating projects that affect or may affect endangered species.
Environmental Education Act of 1990	This Act established the Office of Environmental Education within the U.S. Environmental Protection Agency to develop and administer a federal environmental education program in consultation with other federal natural resource management agencies, including the Fish and Wildlife Service.
Estuary Protection Act of 1968	Authorized the Secretary of the Interior, in cooperation with other federal agencies and the states, to study and inventory estuaries of the United States, including land and water of the Great Lakes, and to determine whether such areas should be acquired for protection. The Secretary is also required to encourage state and local governments to consider the importance of estuaries in their planning activities relative to federal natural resource grants. In approving any state grants for acquisition of estuaries, the Secretary was required to establish conditions to ensure the permanent protection of estuaries.

STATUE	DESCRIPTION
Estuaries and Clean Waters Act of 2000	This law creates a federal interagency council that includes the Director of the Fish and Wildlife Service, the Secretary of the Army for Civil Works, the Secretary of Agriculture, the Administrator of the Environmental Protection Agency and the Administrator for the National Oceanic and Atmospheric Administration. The council is charged with developing a national estuary habitat restoration strategy and providing grants to entities to restore and protect estuary habitat to promote the strategy.
Food Security Act of 1985, as amended (Farm Bill)	The Act contains several provisions that contribute to wetland conservation. The Swampbuster provisions state that farmers who convert wetlands for the purpose of planting after enactment of the law are ineligible for most farmer program subsidies. It also established the Wetland Reserve Program to restore and protect wetlands through easements and restoration of the functions and values of wetlands on such easement areas.
Farmland Protection Policy Act of 1981, as amended	The purpose of this law is to minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. Federal programs include construction projects and the management of federal lands.
Federal Advisory Committee Act (1972), as amended	Governs the establishment of and procedures for committees that provide advice to the federal government. Advisory committees may be established only if they will serve a necessary, nonduplicative function. Committees must be strictly advisory unless otherwise specified and meetings must be open to the public.
Federal Coal Leasing Amendment Act of 1976	Provided that nothing in the Mining Act, the Mineral Leasing Act, or the Mineral Leasing Act for Acquired Lands authorized mining coal on refuges.
Federal-Aid Highways Act of 1968	Established requirements for approval of federal highways through national wildlife refuges and other designated areas to conserve the natural beauty of such areas. The Secretary of Transportation is directed to consult with the Secretary of the Interior and other federal agencies before approving any program or project requiring the use of land under their jurisdiction.
Federal Noxious Weed Act of 1990, as amended	The Secretary of Agriculture was given the authority to designate plants as noxious weeds and to cooperate with other federal, State and local agencies, farmers' associations, and private individuals in measures to control, eradicate, prevent, or retard the spread of such weeds. The Act requires each Federal land-managing agency, including the Fish and Wildlife Service, to designate an office or person to coordinate a program to control such plants on the agency's land and implement cooperative agreements with the states, including integrated management systems to control undesirable plants.

STATUE	DESCRIPTION
Fish and Wildlife Act of 1956	Establishes a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry but also includes the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment and to maintain and increase public opportunities for recreational use of fish and wildlife resources. Among other things, it authorizes the Secretary of the Interior to take such steps as may be required for the development, advancement, management, conservation, and protection of fish and wildlife resources including, but not limited to, research, development of existing facilities, and acquisition by purchase or exchange of land and water or interests therein.
Fish and Wildlife Conservation Act of 1980, as amended	Requires the Service to monitor non-gamebird species, identify species of management concern, and implement conservation measures to preclude the need for listing under the Endangered Species Act.
Fish and Wildlife Coordination Act of 1958	Promotes equal consideration and coordination of wildlife conservation with other water resource development programs by requiring consultation with the Fish and Wildlife Service and the state fish and wildlife agencies where the "waters of a stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted…or otherwise controlled or modified" by any agency under federal permit or license.
Improvement Act of 1978	This act was passed to improve the administration of fish and wildlife programs and amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out volunteer programs.
Fishery (Magnuson) Conservation and Management Act of 1976	Established Regional Fishery Management Councils comprised of federal and state officials, including the Fish and Wildlife Service. It provides for regulation of foreign fishing and vessel fishing permits.
Freedom of Information Act, 1966	Requires all federal agencies to make available to the public for inspection and copying administrative staff manuals and staff instructions; official, published and unpublished policy statements; final orders deciding case adjudication; and other documents. Special exemptions have been reserved for nine categories of privileged material. The Act requires the party seeking the information to pay reasonable search and duplication costs.
Geothermal Steam Act of 1970, as amended	Authorizes and governs the lease of geothermal steam and related resources on public lands. Section 15 c of the Act prohibits issuing geothermal leases on virtually all Service-administrative lands.

STATUE	DESCRIPTION
Lacey Act of 1900, as amended	Originally designed to help states protect their native game animals and to safeguard U.S. crop production from harmful foreign species, this Act prohibits interstate and international transport and commerce of fish, wildlife or plants taken in violation of domestic or foreign laws. It regulates the introduction to America of foreign species.
Land and Water Conservation Fund Act of 1948	This Act provides funding through receipts from the sale of surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources for land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies, including the Fish and Wildlife Service.
Marine Mammal Protection Act of 1972, as amended	The 1972 Marine Mammal Protection Act established a federal responsibility to conserve marine mammals with management vested in the Department of the Interior for sea otter, walrus, polar bear, dugong, and manatee. The Department of Commerce is responsible for cetaceans and pinnipeds, other than the walrus. With certain specified exceptions, the Act establishes a moratorium on the taking and importation of marine mammals, as well as products taken from them.
Migratory Bird Conservation Act of 1929	Established a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds. The role of the commission was expanded by the North American Wetland Conservation Act to include approving wetlands acquisition, restoration, and enhancement proposals recommended by the North American Wetlands Conservation Council.
Migratory Bird Hunting and Conservation Stamp Act of 1934	Also commonly referred to as the “Duck Stamp Act,” requires waterfowl hunters 16 years of age or older to possess a valid federal hunting stamp. Receipts from the sale of the stamp are deposited into the Migratory Bird Conservation Fund for the acquisition of migratory bird refuges.
Migratory Bird Treaty Act of 1918, as amended	This Act implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Except as allowed by special regulations, this Act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, barter, export or import any migratory bird, part, nest, egg, or product.
Mineral Leasing Act for Acquired Lands (1947), as amended	Authorizes and governs mineral leasing on acquired public lands.

STATUE	DESCRIPTION
Minerals Leasing Act of 1920, as amended	Authorizes and governs leasing of public lands for development of deposits of coal, oil, gas, and other hydrocarbons; sulphur; phosphate; potassium; and sodium. Section 185 of this title contains provisions relating to granting rights-of-way over federal lands for pipelines.
Mining Act of 1872, as amended	Authorizes and governs prospecting and mining for the so-called "hardrock" minerals (i.e., gold and silver) on public lands.
National and Community Service Act of 1990	Authorizes several programs to engage citizens of the U.S. in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Among other things, this law establishes the American Conservation and Youth Service Corps to engage young adults in approved human and natural resource projects, which will benefit the public or are carried out on federal or Indian lands.
National Environmental Policy Act of 1969	Requires analysis, public comment, and reporting for environmental impacts of federal actions. It stipulates the factors to be considered in environmental impact statements, and requires that federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unqualified environmental values are given appropriate consideration, along with economic and technical considerations.
National Historic Preservation Act of 1966, as amended	It establishes a National Register of Historic Places and a program of matching grants for preservation of significant historical features. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register.
National Trails System Act (1968), as amended	Established the National Trails System to protect the recreational, scenic, and historic values of some important trails. National recreation trails may be established by the Secretaries of Interior or Agriculture on land wholly or partly within their jurisdiction, with the consent of the involved state(s), and other land managing agencies, if any. National scenic and national historic trails may only be designated by Congress. Several national trails cross units of the National Wildlife Refuge System.
National Wildlife Refuge System Administration Act of 1966	Prior to 1966, there was no single federal law that governed the administration of the various national wildlife refuges that had been established. This Act defines the National Wildlife Refuge System and authorizes the Secretary of the Interior to permit any use of a refuge provided such use is compatible with the major purposes(s) for which the refuge was established.

STATUE	DESCRIPTION
National Wildlife Refuge System Improvement Act of 1997	This Act amends the National Wildlife Refuge System Administration Act of 1966. This Act defines the mission of the National Wildlife Refuge System, establishes the legitimacy and appropriateness of six priority wildlife-dependent public uses, establishes a formal process for determining compatible uses of Refuge System lands, identifies the Secretary of the Interior as responsible for managing and protecting the Refuge System, and requires the development of a comprehensive conservation plan for all refuges outside of Alaska.
Native American Graves Protection and Repatriation Act of 1990	Requires federal agencies and museums to inventory, determine ownership of, and repatriate certain cultural items and human remains under their control or possession. The Act also addresses the repatriation of cultural items inadvertently discovered by construction activities on lands managed by the agency.
Neotropical Migratory Bird Conservation Act of 2000	Establishes a matching grant program to fund projects that promote the conservation of neotropical migratory birds in the united States, Latin America, and the Caribbean.
North American Wetlands Conservation Act of 1989	Provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, the United States, and Mexico. The North American Wetlands Conservation Council was created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. Available funds may be expended for up to 50 percent of the United States' share cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on federal lands).
Refuge Recreation Act of 1962, as amended	This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife-dependent recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.
Partnerships for Wildlife Act of 1992	Establishes a Wildlife Conservation and Appreciation Fund to receive appropriated funds and donations from the National Fish and Wildlife Foundation and other private sources to assist the state fish and game agencies in carrying out their responsibilities for conservation of non-game species. The funding formula is no more that 1/3 federal funds, at least 1/3 foundation funds, and at least 1/3 state funds.

STATUE	DESCRIPTION
Refuge Revenue Sharing Act of 1935, as amended	Provided for payments to counties in lieu of taxes from areas administered by the Fish and Wildlife Service. Counties are required to pass payments along to other units of local government within the county, which suffer losses in tax revenues due to the establishment of Service areas.
Rehabilitation Act of 1973	Requires nondiscrimination in the employment practices of federal agencies of the executive branch and contractors. It also requires all federally assisted programs, services, and activities to be available to people with disabilities.
Rivers and Harbors Appropriations Act of 1899, as amended	Requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States. The Fish and Wildlife Coordination Act provides authority for the Service to review and comment on the effects on fish and wildlife activities proposed to be undertaken or permitted by the Corps of Engineers. Service concerns include contaminated sediments associated with dredge or fill projects in navigable waters.
Sikes Act (1960), as amended	Provides for the cooperation by the Departments of Interior and Defense with state agencies in planning, development, and maintenance of fish and wildlife resources and outdoor recreation facilities on military reservations throughout the United States. It requires the Secretary of each military department to use trained professionals to manage the wildlife and fishery resource under his jurisdiction, and requires that federal and state fish and wildlife agencies be given priority in management of fish and wildlife activities on military reservations.
Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948	This Act provides that upon determination by the Administrator of the General Services Administration, real property no longer needed by a federal agency can be transferred, without reimbursement, to the Secretary of the Interior if the land has particular value for migratory birds, or to a state agency for other wildlife conservation purposes.
Transportation Equity Act for the 21st Century (1998)	Established the Refuge Roads Program, requires transportation planning that includes public involvement, and provides funding for approved public use roads and trails and associated parking lots, comfort stations, and bicycle/pedestrian facilities.
Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended	Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.

STATUE	DESCRIPTION
Water Resources Planning Act of 1965	Established Water Resources Council to be composed of Cabinet representatives including the Secretary of the Interior. The Council reviews river basin plans with respect to agricultural, urban, energy, industrial, recreational and fish and wildlife needs. The act also established a grant program to assist States in participating in the development of related comprehensive water and land use plans.
Wild and Scenic Rivers Act of 1968, as amended	This Act selects certain rivers of the nation possessing remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values; conserves them in a free-flowing condition; and protects their local environments.
Wilderness Act of 1964, as amended	This Act directs the Secretary of the Interior to review every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The Act permits certain activities within designated wilderness areas that do not alter natural processes. Wilderness values are conserved through a "minimum tool" management approach, which requires refuge managers to use the least intrusive methods, equipment, and facilities necessary for administering the areas.
Youth Conservation Corps Act of 1970	Established a permanent Youth Conservation Corps (YCC) program within the Departments of Interior and Agriculture. Within the Service, YCC participants perform many tasks on refuges, fish hatcheries, and research stations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 11593, Protection and Enhancement of the Cultural Environment (1971)	States that if the Service proposes any development activities that may affect the archaeological or historic sites, the Service will consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended.
EO 11644, Use of Off-road Vehicles on Public Land (1972)	Established policies and procedures to ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.
EO 11988, Floodplain Management (1977)	The purpose of this Executive Order is to prevent federal agencies from contributing to the "adverse impacts associated with occupancy and modification of floodplains" and the "direct or indirect support of floodplain development." In the course of fulfilling their respective authorities, federal agencies "shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and conserve the natural and beneficial values served by floodplains."
EO 11989 (1977), Amends Section 2 of EO 11644	Directs agencies to close areas negatively impacted by off-road vehicles.
EO 11990, Protection of Wetlands (1977)	Federal agencies are directed to provide leadership and take action to minimize the destruction, loss of degradation of wetlands, and to conserve and enhance the natural and beneficial values of wetlands.
EO 12372, Intergovernmental Review of Federal Programs (1982)	Seeks to foster intergovernmental partnerships by requiring federal agencies to use the state process to determine and address concerns of state and local elected officials with proposed federal assistance and development programs.
EO 12898, Environmental Justice (1994)	Requires federal agencies to identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 12906, Coordinating Geographical Data Acquisition and Access (1994), Amended by EO 13286 (2003). Amendment of EOs and other actions in connection with transfer of certain functions to Secretary of DHS.	Recommended that the executive branch develop, in cooperation with state, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data. Of particular importance to comprehensive conservation planning is the National Vegetation Classification System (NVCS), which is the adopted standard for vegetation mapping. Using NVCS facilitates the compilation of regional and national summaries, which in turn, can provide an ecosystem context for individual refuges.
EO 12962, Recreational Fisheries (1995)	Federal agencies are directed to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities in cooperation with states and tribes.
EO 13007, Native American Religious Practices (1996)	Provides for access to, and ceremonial use of, Indian sacred sites on federal lands used by Indian religious practitioners and direction to avoid adversely affecting the physical integrity of such sites.
EO 13061, Federal Support of Community Efforts Along American Heritage Rivers (1997)	Established the American Heritage Rivers initiative for the purpose of natural resource and environmental protection, economic revitalization, and historic and cultural preservation. The Act directs Federal agencies to conserve, protect, and restore rivers and their associated resources important to our history, culture, and natural heritage.
EO 13084, Consultation and Coordination With Indian Tribal Governments (2000)	Provides a mechanism for establishing regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications.
EO 13112, Invasive Species (1999)	Federal agencies are directed to prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, accurately monitor invasive species, provide for restoration of native species and habitat conditions, conduct research to prevent introductions and to control invasive species, and promote public education on invasive species and the means to address them. This EO replaces and rescinds EO 11987, Exotic Organisms (1977).

EXECUTIVE ORDERS	DESCRIPTIONS
EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. (2001)	Instructs federal agencies to conserve migratory birds by several means, including the incorporation of strategies and recommendations found in Partners in Flight Bird Conservation plans, the North American Waterfowl Plan, the North American Waterbird Conservation Plan, and the United States Shorebird Conservation Plan, into agency management plans and guidance documents.

Appendix D. Public Involvement

SUMMARY OF PUBLIC SCOPING COMMENTS

The Service invited these agencies, organizations, businesses, and citizens to participate in six public scoping meetings on February 15, 16, 20, 22, and 23, 2001 in Washington, Swan Quarter, Plymouth, Columbia, and Manns Harbor, North Carolina. The staff introduced the audience of 176 citizens to the refuge and its planning process and asked them to identify their issues and concerns. The Service published announcements giving the location, date, and time for the public meetings in the *Federal Register* and legal notices in local newspapers. The staff also sent news releases to local newspapers and public service announcements to television and radio stations. Service personnel placed fifty posters announcing the meeting in local post offices, local government buildings, and stores.

The planning team expanded the issues and concerns to include those generated by the agencies, organizations, businesses, and citizens from the local community. These issues and concerns formed the basis for the development and comparison of the objectives in the different alternatives described in the EA.

The issues raised at the meetings are on the next pages, followed by worksheets the workshop participants completed at each workshop.

Swanquarter National Wildlife Refuge
Comprehensive Conservation Plan Scoping Meetings - Comments
February 15, 16, 20, 22, 23, 2001

Area of Concern	Issue	Disposition
Wildlife - General	Survey fish and wildlife populations.	Addressed in the plan.
	Conduct biological assessment and inventory of flora and fauna inhabiting the refuge.	Addressed in the plan.
	Assess impacts of waterfowl management.	Addressed in the plan.
	Conduct more fish research.	Addressed in the plan.
	Fully staff refuge to survey and manage habitats.	Addressed in the plan.
	Utilize volunteers from community to survey fish and wildlife.	Addressed in the plan.
	Share data with other agencies.	Addressed in the plan.
Wildlife-Red Wolf	Remove all wolves from Hyde County.	Red Wolf Recovery Program Concern.
	Control the red wolf population.	Red Wolf Recovery Program Concern.
	Involve Hyde County residents in the red wolf program.	Red Wolf Recovery Program Concern.
	Seek compromises in red wolf management.	Red Wolf Recovery Program Concern.
Habitat-General	Survey habitats.	Addressed in the plan.
	Increase habitat restoration.	Addressed in the plan.
	Increase exotic and invasive species eradication.	Addressed in the plan.
	Fully staff refuge to survey and manage habitats.	Addressed in the plan.
	Utilize volunteers from community to survey and manage habitat.	Addressed in the plan.
	Share data with other agencies.	Addressed in the plan.
	Consider impacts of water management activities on fish and aquatic resources.	No water management activities at Swanquarter Refuge.
	Maintain ditches.	Addressed in the plan.

Area of Concern	Issue	Disposition
	Check, maintain, and clean wood duck boxes.	Addressed in the plan.
Habitat – Wilderness Area	Address impacts to the Wilderness Area separately.	Addressed in the plan.
	Increase public awareness of Wilderness Areas.	Addressed in the plan.
	Do not allow motorized watercraft within the Wilderness Area.	Outside of F&WS jurisdiction.
	Conduct baseline surveys of plants and animals in the Wilderness Area.	Addressed in the plan.
	Prescribed fire in the Wilderness Area should be similar to natural occurrences, e.g. not human induced on islands.	Addressed in the plan.
Public Use-General	Increase access to refuge.	Addressed in the plan.
	Assess appropriateness of hunting, fishing, and trapping on the refuge, and any proposed changes to these programs.	Addressed in the plan.
	Assess impacts of recreational activities on native flora and fauna.	Addressed in the plan.
	Continue other public use activities.	Addressed in the plan.
	Develop appropriate signage indicating where existing facilities are.	Addressed in the plan.
	Increase programs to attract more people.	Addressed in the plan.
	Provide more ecotourism opportunities.	Addressed in the plan.
Public Use-General	Recognize the importance of the refuge to Hyde County.	Addressed in the plan.
	Expand public uses other than hunting and fishing.	Addressed in the plan.

Area of Concern	Issue	Disposition
	Open the refuge roads and trails to horseback riding.	Limited roadways/trails prohibit horseback riding at Swanquarter Refuge. Would interfere with other uses. Allowed on 30 miles of levees at nearby Mattamuskeet National Wildlife Refuge.
Public Use-Hunting	Develop other areas on the refuge for hunting.	Addressed in the plan.
Public Use – Fishing	Continue providing access to Bell Island fishing.	Addressed in the plan.
	Increase checks of fish limits.	Addressed in the plan.
Public Use - Trapping	Develop a trapping program for furbearers, predators, beavers, and nutria.	Addressed in the plan.
	Increase trapping program for nuisance or over populated furbearers	Addressed in the plan.
Public Use – Environmental Education	Develop education programs at other refuges in the area.	In plan at other refuges, but Swanquarter Refuge would be used also.
Public Use - Interpretation	Incorporate local culture and heritage of the area into refuge programs.	Done at Mattamuskeet Refuge, but could be done for Swanquarter Refuge too.
Resource Protection – Land Protection	Do not acquire land.	Land protection plan would be developed and consider all options for land protection.
	Acquire land from willing landowners to improve connectivity among conservation lands.	Land protection plan would be developed and consider all options for land protection.
	Do not consider corridors as a basis for land protection.	Land protection plan would be developed and consider all options for land protection.
	Re-evaluate existing surveys used to acquire land.	Land protection plan would be developed and consider all options for land protection.
	Cooperate with private landowners to manage land for wildlife.	Addressed in the plan.
Resource Protection – Pest Plants	Control common reed.	Addressed in the plan.

Area of Concern	Issue	Disposition
Administration – General	Separate Mattamuskeet, Swanquarter, and Cedar Island for management purposes.	Consolidation of staff is essential to be fiscally sound.
Administration – Financial Management	Use acquisition funds for refuge management.	Acquisition funds are dedicated for acquisition and cannot be used for management.
Administration – Financial Management	Pursue funding opportunities for wildlife and habitat surveys and habitat management.	The staff applies for grants and will continue to apply.
Administration – Property Management	Use volunteers to maintain property.	Addressed in the plan.
	Develop partnership with major stakeholders in the region to optimize land/water management on and off the refuge.	Addressed in the plan.
Administration – Planning	Involve local citizens and experts in the planning process.	Part of the planning process.

SWANQUARTER NATIONAL WILDLIFE REFUGE PLANNING ISSUES WORKSHEET

ACTIVITY	WHAT WOULD YOU LIKE US TO DO?			
	Keep the Same	Eliminate	Increase	Decrease
WILDLIFE HABITAT ACTIVITIES				
Prescribed Burning	40%	7%	33%	20%
Forest Thinning	47%	7%	33%	13%
Mechanical Vegetation Management (Mowing, Disking)	60%	7%	20%	13%
Chemical Vegetation Management	62%	6%	19%	13%
Shoreline Maintenance	29%	12%	47%	12%
Planting, Seeding, Clearing for Habitat Improvement	56%	6%	31%	6%
Special Protection Status (Wilderness)	38%	23%	31%	8%

ACTIVITY	WHAT WOULD YOU LIKE US TO DO?			
	Keep the Same	Eliminate	Increase	Decrease
PUBLIC USE ACTIVITIES AND FACILITIES				
Fishing and Crabbing	38%	6%	56%	0%
Hunting	41%	6%	41%	12%
Environmental Education (School Students)	41%	0%	53%	6%
Environmental Education (School Teachers)	38%	0%	56%	6%
Wildlife Interpretation (Formal Programs)	40%	0%	47%	13%
Wildlife Interpretation (Printed Material)	27%	0%	60%	13%
Wildlife Interpretation (Interpretative Signs)	33%	7%	47%	13%
Wildlife Photography Opportunities	38%	0%	62%	0%
Wildlife Observation Opportunities	31%	0%	69%	0%
Vehicle Parking Lots	38%	15%	46%	0%
Access for Fishing, Boating, Canoeing	40%	0%	60%	0%
LAW ENFORCEMENT ACTIVITIES				
Visitor Protection	73%	0%	20%	7%
Wildlife Protection	53%	0%	47%	0%
Trespass Violations	47%	0%	53%	0%
Littering/Dumping Violations	18%	0%	82%	0%
OPERATION AND MAINTENANCE				
Road and Firebreak Maintenance	57%	7%	36%	0%
Facilities Maintenance (Signs, Buildings)	54%	0%	38%	8%
Boundary Posting	50%	7%	43%	0%

Appendix E. Appropriate Use Determinations

Swanquarter National Wildlife Refuge Appropriate Use Determinations

An appropriate use determination is the initial decision process a refuge manager follows when first considering whether or not to allow a proposed use on a refuge. The refuge manager must find that a use is appropriate before undertaking a compatibility review of the use. This process clarifies and expands on the compatibility determination process by describing when refuge managers should deny a proposed use without determining compatibility. If a proposed use is not appropriate, it will not be allowed and a compatibility determination will not be undertaken.

Except for the uses noted below, the refuge manager must decide if a new or existing use is an appropriate refuge use. If an existing use is not appropriate, the refuge manager will eliminate or modify the use as expeditiously as practicable. If a new use is not appropriate, the refuge manager will deny the use without determining compatibility. Uses that have been administratively determined to be appropriate are:

- Six wildlife-dependent recreational uses - As defined by the National Wildlife Refuge System Improvement Act of 1997, the six wildlife-dependent recreational uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) are determined to be appropriate. However, the refuge manager must still determine if these uses are compatible.

- Take of fish and wildlife under state regulations - States have regulations concerning take of wildlife that includes hunting, fishing, and trapping. The Service considers take of wildlife under such regulations appropriate. However, the refuge manager must determine if the activity is compatible before allowing it on a refuge.

Statutory Authorities for this policy:

National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. §668dd-668ee. This law provides the authority for establishing policies and regulations governing refuge uses, including the authority to prohibit certain harmful activities. The Act does not authorize any particular use, but rather authorizes the Secretary of the Interior to allow uses only when they are compatible and "under such regulations as he may prescribe." This law specifically identifies certain public uses that, when compatible, are legitimate and appropriate uses within the Refuge System. The law states ". . . it is the policy of the United States that . . .compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System . . .compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management; and . . . when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated . . . the Secretary shall . . . ensure that priority general public uses of the System receive enhanced consideration over other general public uses in planning and management within the System . . . ." The law also states "in administering the System, the Secretary is authorized to take the following actions: . . . issue regulations to carry out this Act." This policy implements the standards set in the Act by providing enhanced consideration of priority general public uses and ensuring other public uses do not interfere with our ability to provide quality, wildlife-dependent recreational uses.

Refuge Recreation Act of 1962, 16 U.S.C. 460k. The Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

Other Statutes that Establish Refuges, including the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) (16 U.S.C. §410hh - 410hh-5, 460 mm - 460mm-4, 539-539e, and 3101 - 3233; 43 U.S.C. 1631 et seq.).

Executive Orders. The Service must comply with Executive Order 11644 when allowing use of off-highway vehicles on refuges. This order requires the Service to designate areas as open or closed to off-highway vehicles in order to protect refuge resources, promote safety, and minimize conflict among the various refuge users; monitor the effects of these uses once they are allowed; and amend or rescind any area designation as necessary based on the information gathered. Furthermore, Executive Order 11989 requires the Service to close areas to off-highway vehicles when it is determined that the use causes or will cause considerable adverse effects on the soil, vegetation, wildlife, habitat, or cultural or historic resources. Statutes, such as ANILCA, take precedence over executive orders.

Definitions:

Appropriate Use
A proposed or existing use on a refuge that meets at least one of the following four conditions.

1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
3) The use involves the take of fish and wildlife under state regulations.
4) The use has been found to be appropriate as specified in section 1.11.

*Native American***.** American Indians in the conterminous United States and Alaska Natives (including Aleuts, Eskimos, and Indians) who are members of federally recognized tribes.

Priority General Public Use. A compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Quality. The criteria used to determine a quality recreational experience include:

- Promotes safety of participants, other visitors, and facilities.
- Promotes compliance with applicable laws and regulations and responsible behavior.
- Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives in a plan approved after 1997.
- Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation.
- Minimizes conflicts with neighboring landowners.
- Promotes accessibility and availability to a broad spectrum of the American people.
- Promotes resource stewardship and conservation.

- Promotes public understanding and increases public appreciation of America's natural resources and the Service's role in managing and protecting these resources.
- Provides reliable/reasonable opportunities to experience wildlife.
- Uses facilities that are accessible and blend into the natural setting.
- Uses visitor satisfaction to help define and evaluate programs.

*Wildlife-Dependent Recreational Use***.** As defined by the Improvement Act, a use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: __Swanquarter National Wildlife Refuge___ _____

Use: __Animal Control – Nuisance Species_____

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _**X**__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate**__X__

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: __Swanquarter National Wildlife Refuge___ _____ _____

Use: __Bicycling, Jogging, Walking, and Walking Dogs__ _____

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _**X**__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate**__X__

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: __Swanquarter National Wildlife Refuge___ _____ _____

Use: __Hunting – Waterfowl (Guided)_____ _____

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _**X**__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate**__X__

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: __Swanquarter National Wildlife Refuge___ _____

Use: __Photography/Filming – Commercial _____

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _**X**__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate**__X__

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: __Swanquarter National Wildlife Refuge___ _____ _____

Use: __Picnicking_____ _____

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _**X**__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate**__X__

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: __Swanquarter National Wildlife Refuge___ _____

Use: __Research

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _**X**__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate**__X__

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: __Swanquarter National Wildlife Refuge___ _____ _____

Use: __Tree Harvest – Firewood/Other____ _____

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _**X**__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate**__X__

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: __Swanquarter National Wildlife Refuge___ _____ _____

Use: __Wildlife Observation – Guiding or Outfitting _ _____

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _**X**__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate**__X__

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: __Swanquarter National Wildlife Refuge___ _____ _____

Use: __Horseback Riding_____ _____

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _**X**__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate__X___ **Appropriate**____

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

Appendix F. Compatibility Determinations

Swanquarter National Wildlife Refuge Compatibility Determination

Uses: The following uses were considered for compatibility determination reviews: animal control–nuisance species; bicycling/jogging/walking/walking dogs; environmental education/interpretation; fishing; hunting–waterfowl; hunting–waterfowl (guided); photography, photography/filming – commercial; picnicking; research; tree harvest-firewood/other; wildlife observation; and wildlife observation-guiding or outfitting. A description and anticipated biological impacts for each use are addressed separately in this compatibility determination.

Refuge Name: Swanquarter National Wildlife Refuge.

Date Established: 1932

Establishing and Acquisition Authority: The refuge was acquired under the authority of the Migratory Bird Conservation Act of 1929

Refuge Purpose: The purpose of Swanquarter National Wildlife Refuge, as reflected in the refuge's authorizing legislation, is to protect and conserve migratory birds, and other wildlife resources through the protection of wetlands, in accordance with the following laws:

> "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. ¤ 715d (Migratory Bird Conservation Act of 1929)

The refuge's purpose and importance to migratory birds, particularly waterfowl, is: *To preserve wintering habitat for waterfowl and wintering and production habitat for wood ducks to meet the habitat goals presented in the Ten-Year Waterfowl Habitat Acquisition Plan and the North American Waterfowl Management Plan.*

National Wildlife Refuge System Mission:

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

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

Other Applicable Laws, Regulations, and Policies:

Antiquities Act of 1906 (34 Stat. 225)
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)
Criminal Code Provisions of 1940 (18 U.S.C. 41)
Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250)
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)

Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat.1119)
Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)
Wilderness Act (16 U.S.C. 1131; 78 Stat. 890)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)
Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
The Property Clause of The U.S. Constitution Article IV 3, Clause 2
The Commerce Clause of The U.S. Constitution Article 1, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)
Executive Order 12996, Management and General public Use of the National Wildlife Refuge System. March 25, 1996
Title 50, Code of Federal Regulations, Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

Compatibility determinations for each description listed were considered separately. Although for brevity, the preceding sections from Uses through Other Applicable Laws, Regulations and Policies are only written once within the CCP, they are part of each descriptive use and become part of that compatibility determination if considered outside of the CCP.

(1) Animal Control – Nuisance Species

Description of Use:
Shooting or trapping of nutria, a non-native exotic species, by volunteers or hired professionals. This activity would be managed through special use permits. Nutria are found throughout the refuge marshes and anywhere where freshwater is present. They feed extensively on marsh vegetation and create channels in marshes which fragment the marsh and make it more vulnerable to destruction from storms.

Availability of Resources:
Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer this use at its current level.

Anticipated Impacts of the Use:
This use may cause minor, temporary disturbance to some wildlife. However, a reduction in nutria would benefit wildlife species that depend on marsh vegetation, particularly the muskrat, which is a native species.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):
____ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
Law enforcement patrols and guidance through special use permits will be used to minimize violations. Disturbance to other wildlife and visitors will be monitored and special use permits amended or suspended if unacceptable disturbance is observed. Issuance of permits will be limited to a maximum of 10 per year.

Justification:
Animal control is necessary to reduce damage to marshes and roadways caused by nutria, a non native exotic species. Only submerged traps would be permitted and would be set in a manner to prevent accidental capture of non target animals. All shooting and trapping would occur in places and/or times of day which would minimize conflict with other refuge visitors. Allowing volunteers or private professionals to control nutria would lessen the amount of time refuge staff have to spend conducting this activity.

Mandatory 10-year Re-evaluation Date:

(2) Bicycling, Jogging, Walking, Walking Dogs

Description of Use:
Bicycling, jogging, walking, and walking dogs on refuge roads for pleasure, wildlife observation, and wildlife photography. Foot travel is allowed throughout the refuge. Bicycles are limited to roads.

Availability of Resources:
Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level.

Anticipated Impacts of the Use:
These uses may cause minor, temporary disturbance to wildlife and may lead to impacts from violations of refuge regulations such as removing plants and harassing wildlife, littering, and vandalism.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):
____ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
Law enforcement patrols and educational activities will be used to minimize violations. Current regulations limiting access to the refuge to daylight hours only will be maintained and enforced. Bicycles will be restricted to roads. Dogs must be kept on a leash and under control of the owner at all times.

Justification:
The roads on the refuge are maintained primarily for refuge management purposes and these recreational uses have little impact on them. Although foot travel is authorized elsewhere, it does not usually result in significant impacts to vegetation and other resources. These activities are generally for pleasure or for wildlife observation and should promote respect for natural resources and support for the refuge. Some people enjoy having a dog as a companion while enjoying the outdoors. This activity is not harmful to wildlife as long as the dog is kept on a leash and is under control of the owner. Historically, participation in these activities has been extremely low on the refuge.

Mandatory 10-year Re-evaluation Date:

(3) Environmental Education and Interpretation

Description of Use:
Environmental education including teaching individuals (students), on- or off-site, about refuge resources and management programs; conducting teacher workshops, on- and off-site, so that teachers may become knowledgeable of refuge resources and management programs; providing teachers with educational tools necessary to teach students about the refuge. Educational activities could be conducted on-site, focusing on environmental or natural resource subjects and led by teachers or other non-refuge staff.

Environmental education activities may include use of refuge structures, exhibits, roads, and waters.

Availability of Resources:
The refuge only has resources to conduct this use on a limited basis.

Anticipated Impacts of the Use:
Environmental education activities conducted off refuge should have no biological impacts on refuge resources. Activities held on-refuge will be both classroom and hands-on in nature. Field (hands-on) activities may result in some trampling of vegetation and minor wildlife disturbance in localized areas. These impacts are not expected to be significant.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):
___ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
If necessary, the location of environmental education activities will be moved around to minimize adverse impacts. Currently, the demand for this use at Swanquarter NWR is fairly low. This activity is not expected to significantly increase disturbance to wildlife in the area or result in other negative impacts.

Justification:
Environmental education activities result in negligible impacts on refuge resources and often provide significant support for refuge programs and purposes by providing individuals with an understanding and appreciation of natural resource functions, natural processes, and man's relationship and dependence on them. Environmental education and interpretation are priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997.

Mandatory 15-year Re-evaluation Date:

(4) Fishing

Description of Use:
Recreational fishing for all fish and blue crabs will be allowed in accordance with state regulations. Fishing in Pamlico Sound is not under the jurisdiction of the refuge but rather the State of North Carolina. The refuge's primary contribution to fishing is through access of which the Bell Island Pier is the only managed facility on the refuge. All boat ramps in the area are private or state owned. Very limited amounts of fishing may occasionally occur along the shoreline or islands of the refuge. All refuge lands, including the Bell Island Pier, are only open to the public during the day - nighttime access is prohibited.

Availability of Resources:
Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level.

Anticipated Impacts of the Use:
Recreational fishing and crabbing have been occurring on the refuge since its establishment. The Bell Island Pier was first constructed by the Civilian Conservation Corp in the 1930s, but has been rebuilt or repaired many times after damage from hurricanes. No adverse impacts on the fisheries resources are expected from continuing these activities. During peak fishing periods, excessive littering at the Bell Island Pier parking lot is expected. However, an agreement with a local prison provides routine cleanup of the area. Some wildlife disturbance may occur.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):
____ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
Fishing and crabbing will be authorized in accordance with applicable State and Federal regulations (including refuge-specific). An active law enforcement program will strive to ensure compliance with all regulations through education and enforcement activities. Law enforcement patrols at times of high fishing pressure will be conducted to minimize wildlife disturbance.

Justification:
At Swanquarter NWR, sport fishing and crabbing provide substantial recreational opportunities for the public and accounts for the majority of its public use. Providing this recreational opportunity to the public results in favorable public opinion and allows the consumptive use of a renewable, sustainable resource without significant adverse impacts on wildlife populations, habitat, or other refuge purposes. Fishing is one of the priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997.

Mandatory 15-year Re-evaluation Date:

(5) Hunting - Waterfowl

Description of Use:
Waterfowl hunting consists of ducks, geese, swans, and American coots on the refuge.

Hunting of all waterfowl during the general waterfowl hunting season is in accordance with state seasons and bag limits. Hunting will not be controlled through a lottery and no user fees will be charged. Hunting will be restricted to approximately 6,120 acres of land on the east portion of the refuge as identified in refuge specific regulations. All access to the refuge waterfowl hunting area is by boat due to location on refuge islands and marshes. Hunting on the open waters of Pamlico Sound, which is identified as the Presidential Proclamation Area (27,000 acres), is prohibited.

Availability of Resources:
Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer this use at its current level

Anticipated Impacts of the Use:
This use is estimated to result in the removal of approximately 400 birds per year from wintering waterfowl and coot populations that generally peak at between 10,000 and 50,000 birds. The hunt is expected to cause temporary disturbance to wildlife in the hunt area and displace waterfowl and other species to other areas of the refuge. Some trampling of vegetation and other minor habitat disturbance may occur from hunters walking to the blinds and blind maintenance activities. This use may lead to some violations of refuge regulations, including taking non-game species, removing plants, and littering.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):

____ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
All federal regulations governing the take of migratory species will apply. Hunting will be allowed from temporary blinds only – no permanent blinds may be constructed. Law enforcement patrols will be conducted to help ensure compliance with applicable regulations.

Justification:
Waterfowl and coots are renewable resources which can sustain a reasonable level of consumptive recreation. This recreational opportunity can be provided to the public without significant adverse impacts on wildlife populations, habitat, or other refuge purposes and should promote favorable public opinion. Hunting is one of the priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997.

Mandatory 15-year Re-evaluation Date:

(6) Hunting – Waterfowl (Guided)

Description of Use:
Waterfowl hunting consists of ducks, geese, swans, and American coots on the refuge with the use of a guide.

Hunting of all waterfowl during the general waterfowl hunting season is in accordance with state seasons and bag limits. Hunting will be restricted to approximately 6,120 acres of land on the east portion of the refuge as identified in refuge specific regulations. All access to the refuge waterfowl hunting area is by boat due to location on refuge islands and marshes. Hunting on the open waters of Pamlico Sound, which is identified as the Presidential Proclamation Area (27,000 acres), is prohibited.

Prospective guides must contact the refuge and request a special use permit to guide on the refuge. Individuals with no wildlife violations or revocation of previous special use permits within the previous five years will be granted a one-year special use permit on a "first come – first served" basis. A maximum of five special use permits for guiding will be issued per year and guiding will only be allowed Monday through Friday to reduce conflicts with non-guided hunters. An annual user fee of $100 will be assessed.

Availability of Resources:
Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer this use at its current level.

Anticipated Impacts of the Use:
This use is estimated to result in the removal of approximately 200 additional birds (400 birds from other hunters) per year from wintering waterfowl and coot populations that generally peak at between 10,000 and 50,000 birds. The hunt is expected to cause temporary disturbance to wildlife in the hunt area and displace waterfowl and other species to other areas of the refuge. Some trampling of vegetation and other minor habitat disturbance may occur from hunters walking to the blinds and blind maintenance activities. This use may lead to some violations of refuge regulations, including taking non-game species, removing plants, and littering. There may be occasional conflicts with non-

guided hunters if guides use a site excessively, however, if necessary, these conflicts can be easily managed through amendments of the special use permit to specifically reduce the weekly use of a specific site by a guide.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):
____ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
All federal regulations governing the take of migratory species will apply. Hunting will be allowed from temporary blinds only – no permanent blinds may be constructed. Law enforcement patrols will be conducted to help ensure compliance with applicable regulations.

Justification:
Waterfowl and coots are renewable resources which can sustain a reasonable level of consumptive recreation. This recreational opportunity can be provided to the public without significant adverse impacts on wildlife populations, habitat, or other refuge purposes and should promote favorable public opinion. Hunting is one of the priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997.

The waterfowl hunting area at Swanquarter NWR is comprised of a complex of islands and marshes intersected with numerous channels or separated by large expanses of water. The area can be very difficult, even dangerous, to negotiate during high winds or low light conditions. Many hunters are afraid to hunt the area due to improper equipment or lack of knowledge. Professional guides can offer these hunters a much safer experience.

Mandatory 10-year Re-evaluation Date:

(7) Wildlife Photography

Description of Use:
This activity involves photographing wildlife on the refuge. This activity may involve the use of temporary blinds. Access to the refuge for this purpose may be by vehicle, boat, bicycle, or foot. Foot travel is generally allowed throughout the refuge. Bicycles are limited to roads. Motorized vehicles are limited to improved roads.

Availability of Resources:
Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level.

Anticipated Impacts of the Use:
The act of photographing wildlife in itself may cause some insignificant, temporary wildlife disturbance. Minor impacts to habitat and vegetation may result from installing photography blinds

and related equipment. The various modes of transportation used to observe wildlife may have somewhat more significant impacts in that they may lead to violation of refuge regulations, such as plant removal, wildlife disturbance, littering, and vandalism. Some animals may be killed or injured when crossing refuge roads.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):
____ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
Law enforcement patrols and educational activities will be used to minimize violations. Current regulations limiting access to the refuge to daylight hours only will be maintained and enforced.

Justification:
Wildlife photography is an activity which the public generally expects to be able to participate in on a wildlife refuge. Wildlife photography often promotes respect for natural resources and support for the refuge. The impacts of this use are generally not significant and can be controlled with law enforcement and education. Wildlife photography is one of the priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997.

Mandatory 15-year Re-evaluation Date:

(8) Photography/Filming – Commercial

Description of Use:
This use involves photographing and filming refuge wildlife, habitats, public use, and related operations for profit-oriented productions or uses. This activity may involve the use of temporary blinds. Access to the refuge for this purpose may be by vehicle, boat, or foot. Special use permits will be used to manage this activity.

Availability of Resources:
Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level. A user fee of $50 for photography and $500 for filming will be assessed. However, these fees may be waived, at the discretion of the refuge manager, if the photography/filming is being conducted primarily to promote the refuge and display the refuge to the public or to raise funds for the refuge.

Anticipated Impacts of the Use:
The act of filming or photographing wildlife may cause some insignificant, temporary wildlife disturbance. Minor impacts to habitat and vegetation may result from installing photography blinds and related equipment.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):
___ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
Commercial photography will be authorized through special use permits which will include any special conditions necessary to ensure the activity is compatible with refuge purposes. This may include an option for the refuge manager to review and edit scripts that describe or interpret Service policy and management. Generally, this use will be authorized only when the desired product is educational or interpretive in nature. All regulations governing recreational photography will apply to commercial photography unless specifically altered by the special use permit.

Justification:
The biological impacts of this activity by an individual or small group are minor and requests for the activity at Swanquarter NWR are very limited. If the number of requests increases, the use can be limited by limiting the number of special use permits issued. Therefore, significant biological impacts from this use are not expected. Commercial photography/filming may be used to promote refuge resources and programs, to educate the general public about wildlife and habitat management, and to foster responsible land ethics and support. Therefore, it can lead to increased support for refuge programs and purposes.

Mandatory 10-year Re-evaluation Date:

(9) Picnicking

Description of Use:
This use involves picnicking at the Bell Island Pier/parking lot and refuge waterfowl hunting area. The refuge pier, parking lot, and waterfowl hunting area are rarely a destination for the sole purpose of picnicking, rather, most picnicking is associated with fishing, crabbing, hunting, and wildlife observation.

Availability of Resources:
Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level.

Anticipated Impacts of the Use:
Picnicking mostly occurs at the Bell Island Pier and parking lot. Although some increase in littering and other violations of refuge regulations may be associated with this use, these impacts are minor.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):

____ Use is Not Compatible
__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
Law enforcement patrols and educational activities will be used to minimize violations. The Bell Island Pier and parking lot, as well as the rest of the refuge, are closed to public access during nighttime hours, which reduces littering and vandalism.

Justification:
Picnicking occurs primarily in conjunction with other uses of the refuge, such as fishing, hunting, or wildlife observation. Picnicking lends itself to enjoyment of wildlife and other natural resources. This, in turn, leads to an appreciation of natural resources and support for the refuge. The impacts of this use are generally not significant and can be controlled with law enforcement and education. There is no other nearby area available where refuge visitors may have a picnic.

Mandatory 10-year Re-evaluation Date:

(10) Research

Description of Use:
Research is a systematic data collection activity usually conducted by non-staff research scientists. The research is generally oriented towards discovering or verifying some fact(s) related to natural resources. The use may include collecting samples (e.g., vegetation, animals, animal products, and soil), collecting measurements, and other research activities.

Availability of Resources:
Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level.

Anticipated Impacts of the Use:
Research activities may result in some trampling of vegetation; minor, temporary wildlife disturbance; and negligible removals of vegetation, animals, soil, or other system components.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):

____ Use is Not Compatible
__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
Research activities will only be authorized through special use permits and will include any special conditions necessary to ensure the activity is compatible with refuge purposes. Only research directly related to the conservation of fish and wildlife resources and generally related to refuge purposes will be authorized. Sampling and other activities will be limited so as to ensure animal mortality and habitat destruction are negligible. Permit restrictions and other refuge regulations will be enforced through an active law enforcement program.

Justification:
Research activities can be limited so as to cause minimal negative impacts to refuge resources. The information obtained is often directly or indirectly related to refuge activities and can be used to improve management practices.

Mandatory 10-year Re-evaluation Date:

(11) Tree Harvest-Firewood/Other

Description of Use:
This use involves the harvest of trees for firewood or other uses. Only trees may be harvested which reduce the labor of refuge staff that would otherwise be needed to remove the trees. Most trees harvested will be trees which have fallen within a road right-of-way. Occasionally, trees may need to be harvested which are part of another approved project, such as a new fire-break or trail. This activity will be managed through the use of special use permits.

Availability of Resources:
Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level. This activity will actually reduce refuge labor costs.

Anticipated Impacts of the Use:
These uses may cause minor, temporary disturbance to wildlife and may lead to impacts from violations of refuge regulations, such as removing plants and harassing wildlife, littering, and vandalism.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):
___ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
Tree harvest activities will only be authorized through special use permits and the permits will include any special conditions necessary to ensure that the activity is compatible with refuge purposes. Only tree harvests directly related to a refuge project will be authorized. Permit restrictions and other refuge regulations will be enforced through an active law enforcement program.

Justification:
Tree harvest by the public will not increase tree removal from the refuge, it will only reduce refuge labor costs, as refuge staff would otherwise need to remove the trees as the trees removed are those which are having a negative impact on a refuge project, such as hindering road access.

Mandatory 10-year Re-evaluation Date:

(12) Wildlife Observation

Description of Use:
This use involves observing wildlife on the refuge. This activity may involve the use of temporary blinds. Access to the refuge for this purpose may be by vehicle, boat, bicycle, or foot. Foot travel is generally allowed throughout the refuge. Bicycles are limited to refuge roads. Motorized vehicles are limited to improved roads.

Availability of Resources:
Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level.

Anticipated Impacts of the Use:
The act of observing wildlife in itself may cause some insignificant, temporary wildlife disturbance. The various modes of transportation used to observe wildlife may have somewhat more significant impacts in that they may lead to violation of refuge regulations, such as plant removal, wildlife disturbance, littering, and vandalism. Some animals may be killed or injured from vehicles crossing refuge roads.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):
____ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
Law enforcement patrols and educational activities will be used to minimize violations. Current regulations limiting access to the refuge to daylight hours only will be maintained and enforced.

Justification:
Wildlife observation often promotes respect for natural resources and support for the refuge. The impacts of this use are generally not significant and can be controlled with law enforcement and education. Wildlife observation is one of the priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997.

Mandatory 15-year Re-evaluation Date:

(13) Wildlife Observation – Guiding or Outfitting

Description of Use:
This use involves observing wildlife on the refuge through the use of a guide or outfitter. This activity may involve the use of temporary blinds. Access to the refuge for this purpose may be by vehicle, boat, bicycle, or foot. Foot travel is generally allowed throughout the refuge. Bicycles are limited to refuge roads. Motorized vehicles are limited to improved roads. This activity will be managed through the use of special use permits.

Availability of Resources:
Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level. A user fee of $50 per tour will be assessed. However, these fees may be adjusted either higher or lower at the discretion of the refuge manager, if the revenue generated from the tours is significantly more than currently anticipated.

Anticipated Impacts of the Use:
The act of observing wildlife in itself may cause some insignificant, temporary wildlife disturbance. The various modes of transportation used to observe wildlife may have somewhat more significant impacts in that they may lead to violation of refuge regulations, such as plant removal, wildlife disturbance, littering, and vandalism. Some animals may be killed or injured from vehicles crossing refuge roads.

Public Review and Comment:
This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment.

Determination (check one below):
____ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
Guided or outfitted tours will be authorized through the use of special use permits which will include any special conditions necessary to ensure the activity is compatible with refuge purposes.

Law enforcement patrols will be used to minimize violations and ensure permit compliance.

Justification:
Wildlife observation often promotes respect for natural resources and support for the refuge. The impacts of this use are generally not significant and can be controlled with law enforcement and education. Guided and outfitted wildlife observation may be used to promote refuge resources and programs, to educate the general public about wildlife and habitat management, and to foster responsible land ethics and political support. Therefore, it can lead to increased support for refuge programs and purposes. It also introduces novices to refuges who without assistance might not visit a refuge.

Mandatory 10-year Re-evaluation Date:

APPROVAL OF COMPATIBILITY DETERMINATIONS

The signature of approval is for all compatibility determinations considered within the comprehensive conservation plan. If one of the descriptive uses is considered for compatibility outside of the comprehensive conservation plan, the approval signature becomes part of that determination.

Refuge Manager: _____
(Signature and Date)

Regional Compatibility Coordinator: _____
(Signature and Date)

Refuge Supervisor: _____
(Signature and Date)

Regional Chief: _____
(Signature and Date)

Appendix G. Intra-Service Section 7 Biological Evaluation

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION

Originating Person: Bruce Freske
Telephone Number: 252-473-1131
E-Mail: bruce_freske@fws.gov
Date:

Project Name: Swanquarter National Wildlife Refuge Comprehensive Conservation Plan

I. Service Program:
___ **Ecological Services**
___ **Federal Aid**
___ **Clean Vessel Act**
___ **Coastal Wetlands**
___ **Endangered Species Section 6**
___ **Partners for Fish and Wildlife**
___ **Sport Fish Restoration**
___ **Wildlife Restoration**
___ **Fisheries**
_X_ Refuges/Wildlife

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

III. Station Name: Swanquarter National Wildlife Refuge

IV. Description of Proposed Action (attach additional pages as needed): Implementation of the Comprehensive Conservation Plan for Swanquarter National Wildlife Refuge by adopting the proposed alternative that provides guidance, management direction and operation plans for the next 15 years.

V. Pertinent Species and Habitat:

A. Include species habitat and occurrence map: See Figures 5 and 9.

B. **Complete the following table:**

SPECIES/CRITICAL HABITAT	STATUS[1]
Loggerhead Sea Turtle	Threatened
Green Sea Turtle	Threatened
Hawksbill Sea Turtle	Endangered
Kemp's Ridley Sea Turtle	Endangered
Leatherback Sea Turtle	Endangered
American Alligator	Threatened
Piping Plover	Threatened
Red-cockaded Woodpecker	Endangered
Red Wolf	Threatened
West Indian Manatee	Endangered
Shortnose Sturgeon	Endangered
Seabeach Amaranth	Threatened
Sensitive Joint Vetch	Endangered

[1]STATUS: E=endangered, T=threatened, PE=proposed endangered, PT=proposed threatened, CH=critical habitat, PCH=proposed critical habitat, C=candidate species

VI. Location (attach map): See Figure 1.

A. Ecoregion Number and Name: Roanoke - Tar - Neuse - Cape Fear No. 34

B. County and State: Hyde, North Carolina

C. Section, township, and range (or latitude and longitude):
Latitude: 35.3432, Longitude: -76.2788

D. Distance (miles) and direction to nearest town: Immediately south of Swanquarter, North Carolina

E. Species/habitat occurrence:

Loggerhead Sea Turtle – No record of occurrence near mainland Hyde County within the past 20 years.

Green Sea Turtle – No record of occurrence near mainland Hyde County within the past 20 years.

Hawksbill Sea Turtle – No record of occurrence near mainland Hyde County within the past 20 years.

Kemp's Ridley Sea Turtle – No record of occurrence near mainland Hyde County within the past 20 years.

Leatherback Sea Turtle – No record of occurrence near mainland Hyde County within the past 20 years ago.

American Alligator – Observed on the refuge wherever freshwater pools or streams are present.

Piping Plover – No record of occurrence near mainland Hyde County within the past 20 years.

Red-cockaded Woodpecker - Record of occurrence in mainland Hyde County within the past 20 years. Current record of occurrence near the refuge but has not been documented on the refuge. Generally located in open stands of mature loblolly pine. Forested habitats on the refuge which could possibly harbor RCW's include: Mixed Pine Hardwood, Pond Pine Pocosin, and Estuarine Fringe Loblolly Pine.

Red Wolf - Experimental population established and monitored on the refuge. One to two packs hunt on the refuge at a given time but no dens are known to have been located on the refuge.

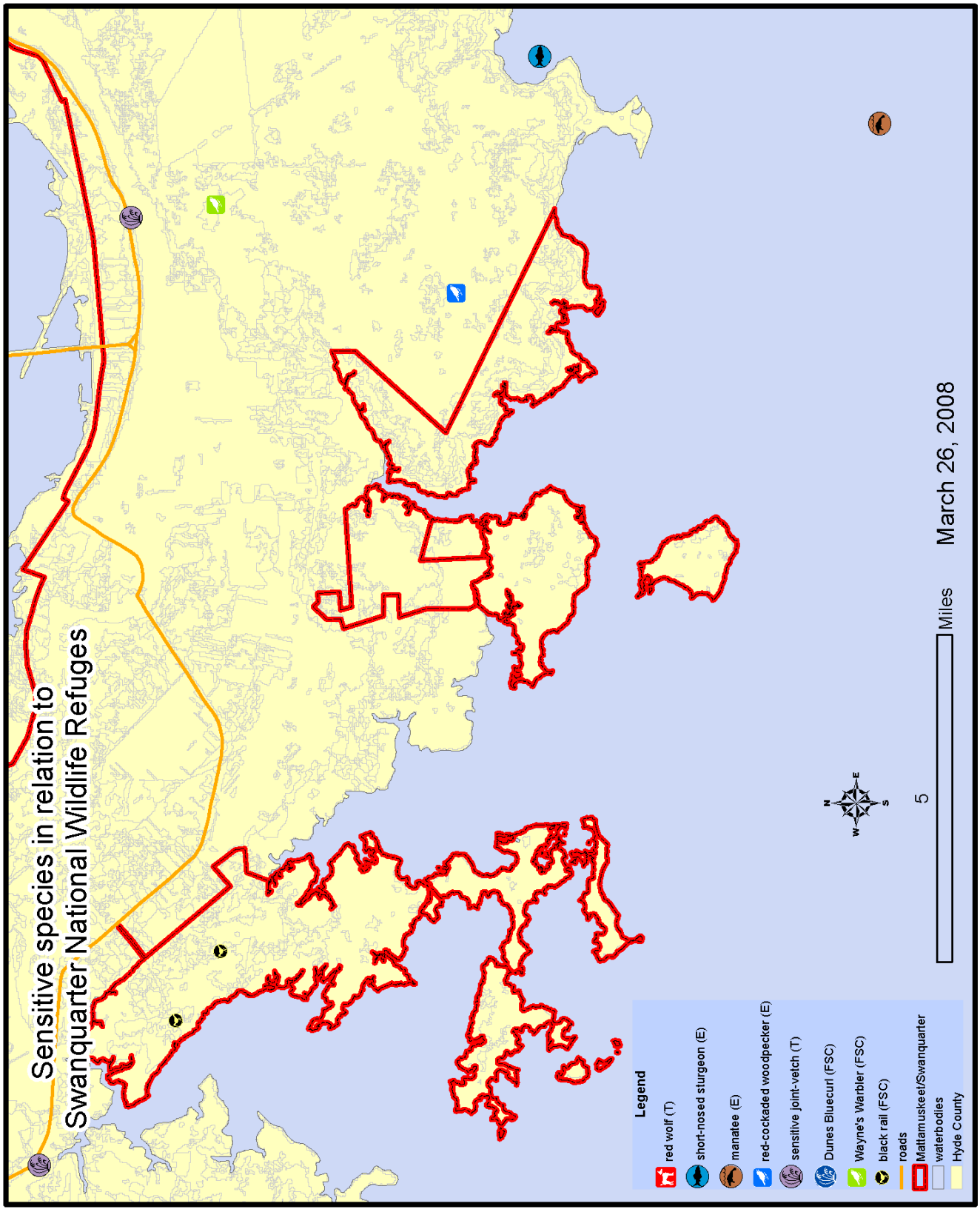
West Indian Manatee - Record of occurrence in Hyde County near Swanquarter Refuge within the past 20 years.

Shortnose Sturgeon – Record of occurrence in Hyde County near Swanquarter Refuge within the past 20 years.

Seabeach Amaranth – No record of occurrence in mainland Hyde County within the past 20 years.

Sensitive Joint Vetch - Record of occurrence in mainland Hyde County within 20 years near Swanquarter Refuge.

Figure 9. Sensitive species in relation to Swanquarter NWR



VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitats in item V. B (attach additional pages as needed).

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
Loggerhead Sea Turtle	Disturbance by staff and visitors during nesting season.
Green Sea Turtle	Disturbance by staff and visitors during nesting season.
Hawksbill Sea Turtle	Disturbance by staff and visitors during nesting season.
Kemp's Ridley Sea Turtle	Disturbance by staff and visitors during nesting season.
Leatherback Sea Turtle	Disturbance by staff and visitors during nesting season.
American Alligator	Disturbance by staff and visitors during nesting season.
Piping Plover	Disturbance by staff and visitors during nesting season.
Red-cockaded Woodpecker	Disturbance by staff and visitors during nesting season. Lack of understory management.
Red Wolf	Disturbance by staff and visitors.
West Indian Manatee	Disturbance by boaters and anglers. Water quality degradation and lack of submerged aquatic vegetation.
Shortnose Sturgeon	Disturbance by boaters and anglers. Water quality degradation and lack of submerged aquatic vegetation.
Seabeach Amaranth	Trampling of plants by staff and visitors before seed maturation.
Sensitive Joint Vetch	Trampling of plants by staff and visitors before seed maturation. Lack of understory management.

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

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
Loggerhead Sea Turtle	Restrict access to nesting area.
Green Sea Turtle	Restrict access to nesting area.
Hawksbill Sea Turtle	Restrict access to nesting area.
Kemp's Ridley Sea Turtle	Restrict access to nesting area.
Leatherback Sea Turtle	Restrict access to nesting area.
American Alligator	Increase law enforcement in areas where alligators and the public may meet to reduce potential harassment or illegal killing of alligators.
Piping Plover	Restrict access to nesting area.
Red-cockaded Woodpecker	Restrict access to nesting area. Allow pines to grow old enough to develop cavities. Manage understory to maintain height below cavities.
Red Wolf	Increase law enforcement in areas where red wolves and the public may meet to reduce potential harassment or illegal killing of red wolves.
West Indian Manatee	Restrict access when manatees are in the area. Cooperate with state agencies to monitor and improve water quality.
Shortnose Sturgeon	Cooperate with state agencies to monitor and improve water quality.
Seabeach Amaranth	Restrict access to areas with plants until after seed maturation.
Sensitive Joint Vetch	Restrict access to areas with plants until after seed maturation.

VIII. Effect Determination and Response Requested:

SPECIES/ CRITICAL HABITAT	DETERMINATION[1]			RESPONSE[1]
	NE	NA	AA	
Loggerhead Sea Turtle		X		Concurrence
Green Sea Turtle		X		Concurrence
Hawksbill Sea Turtle		X		Concurrence
Kemp's Ridley Sea Turtle		X		Concurrence
Leatherback Sea Turtle		X		Concurrence
American Alligator		X		Concurrence
Piping Plover		X		Concurrence
Roseate Tern		X		Concurrence
Red-cockaded Woodpecker		X		Concurrence
Red Wolf		X		Concurrence
West Indian Manatee		X		Concurrence
Eastern Cougar		X		Concurrence
Shortnose Sturgeon		X		Concurrence
Seabeach Amaranth		X		Concurrence
Sensitive Joint Vetch		X		Concurrence

[1]*DETERMINATION/RESPONSE REQUESTED:*

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a Concurrence is recommended for a complete Administrative Record.

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a Concurrence.

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested for listed species is Formal Consultation. Response Requested for proposed or candidate species is Conference.

Bruce Frosh

_____ 3/31/08

Signature (originating station) **Date**

_____**Refuge Manager**_____

Title

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence _____ Nonconcurrence _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

_____ _____

Signature **Date**

_____ _____

Title

Office

Appendix H. Wilderness Review

The Wilderness Act of 1964 defines a wilderness area as an area of federal land that retains its primeval character and influence, without permanent improvements or human inhabitation, and is managed so as to conserve its natural conditions and which:

1. generally appears to have been influenced primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;

2. has outstanding opportunities for solitude or primitive and unconfined types of recreation;

3. has at least 5,000 contiguous roadless acres or is of sufficient size to make practicable its preservation and use in an unimpeded condition; or is a roadless island, regardless of size;

4. does not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or its wilderness character could be restored through appropriate management at the time of review; and

5. may contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

The lands within Swanquarter NWR were reviewed for their suitability in meeting the criteria for wilderness, as defined by the Wilderness Act of 1964. Approximately 8,800 acres of Swanquarter NWR are part of the National Wilderness Preservation System. This designation was made in 1974. No additional land in the refuge was found to meet these criteria. Therefore, the suitability of refuge lands for wilderness designation is not further analyzed in this plan.

Appendix I. Refuge Biota

Total Species - 253, Breeding Species - 77
A = Abundant, C = Common, F = Fairly Common, U = Uncommon, O = Occasional, R = Rare
*species with confirmed breeding records

ANIMALS				
BIRDS				
SPECIES	**SPRING**	**SUMMER**	**FALL**	**WINTER**
Anhinga		R		R
Avocet, American		R	R	R
Bittern, American*	U	U	U	U
Bittern, Least*	O	U	U	U
Blackbird, Brewer's				R
Blackbird, Red-winged*	A	A	A	A
Blackbird, Rusty				O
Blackbird, Yellow-headed	R			R
Bluebird, Eastern*	U	U		O
Bobolink	O		O	
Bobwhite, Northern*	U	U	U	U
Brant			R	R
Bufflehead			C	C
Bunting, Indigo*	U	U	U	
Bunting, Snow				R
Canvasback			U	U
Cardinal, Northern*	C	C	C	C
Catbird, Gray*	U	U	U	U
Chat, Yellow-breasted	O		O	R
Chickadee, Carolina*	C	C	C	C
Chuck-will's Widow*	U	U	U	
Coot, American	C	O	A	C
Cormorant, Double-crested	C	U	C	C
Cowbird, Brown-headed*	C	U	U	C
Creeper, Brown			O	O
Crow, American*	C	C	C	C
Crow, Fish*	C	C	C	C
Cuckoo, Black-billed	R	R	R	
Cuckoo, Yellow-billed*	U	U		
Dove, Mourning*	C	C	C	C
Dowitcher, Long-billed	O		U	U
Dowitcher, Short-billed	O		U	U
Duck, American Black*	U	O	C	C
Duck, Fulvous Whistling			R	R
Duck, Long-tailed			U	U
Duck, Ring-necked			C	C

ANIMALS (continued)				
BIRDS (continued)				
SPECIES	SPRING	SUMMER	FALL	WINTER
Duck, Ruddy			C	C
Duck, Wood*	U	U	C	C
Dunlin	O	U	U	O
Eagle, Bald (Threatened)*	O	O	U	U
Eagle, Golden		R	R	
Egret, Cattle		U	U	R
Egret, Great	A	A	A	A
Egret, Snowy	C	C	C	C
Falcon, Peregrine			U	U
Finch, House	U		U	U
Finch, Purple	O		O	U
Flicker, Northern*	C	C	C	C
Flycatcher, Acadian	U	U		
Flycatcher, Great Crested*	U	U	O	
Gadwall	U	O	C	C
Gannet, Northern			R	U
Gnatcatcher, Blue-Gray*	O	O	O	O
Godwit, Hudsonian			R	
Goldeneye, Common		U	U	U
Goldfinch, American	U			U
Goose, Canada*	C	C	C	C
Goose, Greater White-fronted			R	R
Goose, Snow			C	C
Grackle, Boat-tailed	U	U	U	U
Grackle, Common*	C	C	C	A
Grebe, Eared	O			O
Grebe, Horned	U			U
Grebe, Pied-billed*	U	U	C	C
Grosbeak, Blue*	U	U	U	
Grosbeak, Evening				R
Gull, Bonaparte’s	O		U	U
Gull, Great Black-backed	O		C	C
Gull, Herring	C	C	C	C
Gull, Laughing	C	C	C	O
Gull, Ring-billed	C	C	C	C
Harrier, Northern	U		C	C
Hawk, Broad-winged			O	R
Hawk, Cooper’s	U	U	U	U
Hawk, Red-shouldered	U	U	U	U
Hawk, Red-tailed*	U	U	C	C
Hawk, Rough-legged				R
Hawk, Sharp-shinned*	U	U	U	U
Heron, Great Blue*	A	A	A	A
Heron, Black-crowned Night*	U	U	U	U

ANIMALS (continued)				
BIRDS (continued				
SPECIES	SPRING	SUMMER	FALL	WINTER
Heron, Green*	C	C	C	
Heron, Little Blue	U	U	U	U
Heron, Tri-colored	U	U	U	U
Heron, Yellow-crowned Night			R	
Hummingbird, Ruby-throated*	U	U	O	R
Ibis, Glossy	U	U	U	U
Ibis, White		O	O	O
Jay, Blue*	U	U	U	U
Junco, Dark-eyed	U		U	U
Kestrel, American			C	C
Killdeer*	O	O	O	U
Kingbird, Eastern*	U	U	O	
Kingbird, Western			R	
Kingfisher, Belted	C	C	C	C
Kinglet, Golden-crowned				U
Kinglet, Ruby-crowned	U		U	C
Knot, Red	O		O	
Lark, Horned			R	R
Loon, Common			U	C
Loon, Red-throated			U	C
Mallard*	U	U	C	C
Martin, Purple	U	U		
Meadowlark, Eastern*	C	C	C	C
Merganser, Common			U	U
Merganser, Hooded			U	U
Merganser, Red-breasted			U	U
Merlin			U	U
Mockingbird, Northern*	C	C	C	C
Moorhen, Common	U	U	O	O
Nighthawk, Common	U	U	U	
Nuthatch, Brown-headed*	U	U	U	U
Nuthatch, Red-breasted			R	R
Nuthatch, White-breasted*	U	U	R	R
Oriole, Baltimore			O	R
Oriole, Orchard*	U	U	O	
Osprey*	C	C	U	O
Ovenbird	U	U	U	
Owl, Barn	O	O	O	O
Owl, Barred*	U	U	U	U
Owl, Eastern Screech*	U	U	U	U
Owl, Great Horned*	U	U	U	U
Owl, Northern Saw Whet	R	R	R	R
Oystercatcher, American		O		
Parula, Northern	U	O	U	
Pelican, American white			R	R

ANIMALS (continued)				
BIRDS (continued)				
SPECIES	SPRING	SUMMER	FALL	WINTER
Pelican, Brown	U	U	U	U
Phalarope, Red-necked			R	
Phoebe, Eastern	O	U	U	C
Pintail, Northern			C	C
Pipit, American			U	U
Plover, America Golden	R			
Plover, Black-bellied	U	U	U	U
Plover, Semipalmated	U	U	U	O
Plover, Wilson's	U		U	O
Rail, Black	U	U		R
Rail, Clapper*	U	U	U	U
Rail, King*	U	U	U	U
Rail, Virginia			U	U
Rail, Yellow			R	R
Redhead			U	U
Redstart, American	U		U	
Robin, American*	C	C	U	U
Sanderling	O		O	
Sandpiper, Baird's			R	R
Sandpiper, Least	U		U	U
Sandpiper, Pectoral	O		O	
Sandpiper, Semipalmated	U	U	U	U
Sandpiper, Solitary	U		U	
Sandpiper, Spotted	U	U	U	
Sandpiper, Upland	R		R	
Sandpiper, Western	U	U	U	U
Sapsucker, Yellow-bellied	U	U	U	U
Scaup, Greater			U	U
Scaup, Lesser			C	C
Scoter, Black			U	U
Scoter, Surf			U	U
Scoter, White-winged			O	O
Shoveler, Northern	O		C	C
Shrike, Loggerhead				R
Siskin, Pine				R
Skimmer, Black	O	O	R	R
Snipe, Common	U	U	U	U
Sora	U		U	
Sparrow, American Tree			O	O
Sparrow, Chipping	O	O	U	U
Sparrow, Field	U	U	U	U
Sparrow, Fox	U		U	U
Sparrow, Grasshopper				O
Sparrow, House*	U	U	U	U
Sparrow, Saltmarsh Sharp-tailed			O	O

ANIMALS (continued)				
BIRDS (continued)				
SPECIES	SPRING	SUMMER	FALL	WINTER
Sparrow, Savannah	U		U	C
Sparrow, Seaside*	U	U	U	u
Sparrow, Song	U		U	C
Sparrow, Swamp	U		U	C
Sparrow, Vesper				U
Sparrow, White-crowned			U	U
Sparrow, White-throated	U		U	C
Starling, European*	C	C	C	C
Stilt, Black-necked	O	O	R	
Swallow, Barn*	C	C	O	
Swallow, Northern Rough-winged	U			
Swallow, Tree	O	U	A	A
Swan, Tundra	O	R	A	A
Swift, Chimney	U	U	O	
Tanager, Scarlet	R			
Tanager, Summer	U	U		
Teal, American Green-winged			C	C
Teal, Blue-winged	U		U	U
Tern, Black			O	
Tern, Caspian	O		O	
Tern, Common*	U	U	U	
Tern, Forster's*	U	U	U	U
Tern, Gull-billed		O		O
Tern, Least		U		
Tern, Royal	O	O	O	R
Tern, Sandwich		R		
Thrasher, Brown*	C	C	C	C
Thrush, Hermit	U		U	U
Thrush, Swainson's	O		O	
Thrush, Wood*	U	U	U	
Titmouse, Tufted*	C	C	C	C
Towhee, Eastern*	C	C	C	C
Turkey, Wild	O	O	O	O
Turnstone, Ruddy	O		R	
Vireo, Blue-headed	O		O	R
Vireo, Red-eyed*	U	U	U	
Vireo, White-eyed*	U	U	U	R
Vireo, Yellow-throated	O	O	O	
Vulture, Black*	U	U	U	U
Vulture, Turkey*	C	C	C	C
Warbler, Black-and-white	O		U	O
Warbler, Blackburnian	R			
Warbler, Blackpoll	O			
Warbler, Black-throated Blue	O	O	O	
Warbler, Black-throated Green	O	O		

ANIMALS (continued)				
BIRDS (continued)				
SPECIES	SPRING	SUMMER	FALL	WINTER
Warbler, Canada	R		U	R
Warbler, Cape May	R		R	
Warbler, Chestnut-sided	R		U	R
Warbler, Hooded*	U	U		
Warbler, Magnolia	R			
Warbler, Nashville				R
Warbler, Orange-crowned			U	U
Warbler, Palm	U		U	U
Warbler, Pine*	U	U	U	U
Warbler, Prairie*	U	U	R	R
Warbler, Prothonotary*	U	U		
Warbler, Swainson's	R	R		
Warbler, Worm-eating	R			
Warbler, Yellow*	O	O	R	R
Warbler, Yellow-rumped	C		C	C
Warbler, Yellow-throated*	U	U	O	
Waterthrush, Northern	O		O	
Waxwing, Cedar	U		U	U
Whimbrel	O		O	
Whip-poor-will		U	U	
Wigeon, American	U		C	C
Wigeon, Eurasian			O	O
Willet*	U	U	O	O
Wood Pewee, Eastern*	U	U	U	O
Woodcock, American	O	O	U	C
Woodpecker, Downy*	U	U	U	U
Woodpecker, Hairy*	U	U	U	U
Woodpecker, Pileated*	U	U	U	U
Woodpecker, Red-bellied*	C	C	C	C
Woodpecker, Red-headed*	O	O	O	O
Wren, Carolina*	C	C	C	C
Wren, House*	U	U	U	U
Wren, Marsh*	U	U	U	U
Wren, Sedge			U	U
Wren, Winter			U	U
Yellowlegs, Greater	O	O	U	U
Yellowlegs, Lesser	U	O	U	O
Yellow-throat, Common*	C	C	C	C

FAUNA	
BIRDS	
COMMON NAME	**SCIENTIFIC NAME**
Anhinga	*Anhinga anhinga*
Avocet, American	*Recurvirostra americana*
Bittern, American*	*Botaurus lentiginosus*
Bittern, Least*	*Ixobrychus exilis*
Blackbird, Brewer's	*Euphagus cyanocephalus*
Blackbird, Red-winged*	*Agelaius phoeniceus*
Blackbird, Rusty	*Euphagus carolinus*
Blackbird, Yellow-headed	*Xanthocephalus xanthocephalus*
Bluebird, Eastern*	*Sialia sailis*
Bobolink	*Dolichonyx oryzivorus*
Bobwhite, Northern*	*Colinus virginianus*
Brant	*Branta bernicla*
Bufflehead	*Bucephala albeola*
Bunting, Indigo*	*Passerina cyanea*
Bunting, Snow	*Plectrophenax nivalis*
Canvasback	*Aythya valisineria*
Cardinal, Northern*	*Cardinalis cardinalis*
Catbird, Gray*	*Dumetella carolinensis*
Chat, Yellow-breasted	*Icteria virens*
Chickadee, Carolina*	*Poecile carolinensis*
Chuck-will's Widow*	*Caprimulgus carolinensis*
Coot, American	*Fulica americana*
Cormorant, Double-crested	*Phalacrocorax auritus*
Cowbird, Brown-headed*	*Molothrus ater*
Creeper, Brown	*Certhia americana*
Crow, American*	*Corvus brachyrhynchos*
Crow, Fish*	*Corvus ossifragus*
Cuckoo, Black-billed	*Coccyzus erythropthalmus*
Cuckoo, Yellow-billed*	*Coccyzus americanus*
Dove, Mourning*	*Zenaida macroura*
Dowitcher, Long-billed	*Limnodromus scolopaceus*
Dowitcher, Short-billed	*Limnodromus griseus*
Duck, American Black*	*Anas rubripes*
Duck, Fulvous Whistling	*Dendrocygna bicolor*
Duck, Long-tailed	*Clangula hyemalis*
Duck, Ring-necked	*Aythya ferina*
Duck, Ruddy	*Oxyura jamaicensis*
Duck, Wood*	*Aix sponsa*
Dunlin	*Calidris alpina*
Eagle, Bald (Threatened)*	*Haliaeetus leucocephalus*
Eagle, Golden	*Aquila chrysaetos*

FAUNA (CONTINUED)	
BIRDS (CONTINUED)	
COMMON NAME	**SCIENTIFIC NAME**
Egret, Cattle	*Bubulcus ibis*
Egret, Great	*Ardea alba*
Egret, Snowy	*Egretta thula*
Falcon, Peregrine	*Falco peregrinus*
Finch, House	*Carpodacus mexicanus*
Finch, Purple	*Carpodacus purpureus*
Flicker, Northern*	*Colaptes auratus*
Flycatcher, Acadian	*Empidonax virescens*
Flycatcher, Great Crested*	*Myiarchus crinitus*
Gadwall	*Anas strepera*
Gannet, Northern	*Morus bassanus*
Gnatcatcher, Blue-Gray*	*Polioptila caerulea*
Godwit, Hudsonian	*Limosa haemastica*
Goldeneye, Common	*Bucephala clangula*
Goldfinch, American	*Carduelis tristis*
Goose, Canada*	*Branta canadensis*
Goose, Greater White-fronted	*Anser albifrons*
Goose, Snow	*Chen caerulescens*
Grackle, Boat-tailed	*Quiscalus major*
Grackle, Common*	*Quiscalus quiscula*
Grebe, Eared	*Podiceps nigricollis*
Grebe, Horned	*Podiceps auritus*
Grebe, Pied-billed*	*Podilymbus podiceps*
Grosbeak, Blue*	*Passerina caerulea*
Grosbeak, Evening	*Coccothraustes vespertinus*
Gull, Bonaparte's	*Larus philadelphia*
Gull, Great Black-backed	*Larus marinus*
Gull, Herring	*Larus argentatus*
Gull, Laughing	*Larus atricilla*
Gull, Ring-billed	*Larus delawarensis*
Harrier, Northern	*Circus cyaneus*
Hawk, Broad-winged	*Buteo platypterus*
Hawk, Cooper's	*Accipiter cooperii*
Hawk, Red-shouldered	*Buteo lineatus*
Hawk, Red-tailed*	*Buteo jamaicensis*
Hawk, Rough-legged	*Buteo lagopus*
Hawk, Sharp-shinned*	*Accipiter straitus*
Heron, Black-crowned Night*	*Nycticorax nycticorax*
Heron, Great Blue*	*Ardea herodias*
Heron, Green*	*Butorides virescens*
Heron, Little Blue	*Egretta caerulea*
Heron, Tri-colored	*Egretta tricolor*

FAUNA (CONTINUED)	
BIRDS (CONTINUED)	
COMMON NAME	**SCIENTIFIC NAME**
Heron, Yellow-crowned Night	*Nyctanassa violacea*
Hummingbird, Ruby-throated*	*Archilochus colubris*
Ibis, Glossy	*Plegadis falcinellus*
Ibis, White	*Eudocimus albus*
Jay, Blue*	*Cyanocitta cristata*
Junco, Dark-eyed	*Junco hyemalis*
Kestrel, American	*Falco sparverius*
Killdeer*	*Charadrius vociferus*
Kingbird, Eastern*	*Tyrannus tyrannus*
Kingbird, Western	*Tyrannus verticalis*
Kingfisher, Belted	*Ceryle alcyon*
Kinglet, Golden-crowned	*Regulus satrapa*
Kinglet, Ruby-crowned	*Regulus calendula*
Knot, Red	*Calidris canutus*
Lark, Horned	*Eremophila alpestris*
Loon, Common	*Gavia immer*
Loon, Red-throated	*Gavia stellata*
Mallard*	*Anas platyrhynchos*
Martin, Purple	*Progne subis*
Meadowlark, Eastern*	*Stumella magna*
Merganser, Common	*Mergus merganser*
Merganser, Hooded	*Lophodytes cucullatus*
Merganser, Red-breasted	*Mergus serrator*
Merlin	*Falco columbarius*
Mockingbird, Northern*	*Mimus polyglottos*
Moorhen, Common	*Gallinula chloropus*
Nighthawk, Common	*Chordeiles minor*
Nuthatch, Brown-headed*	*Sitta pusilla*
Nuthatch, Red-breasted	*Sitta canadensis*
Nuthatch, White-breasted*	*Sitta carolinensis*
Oriole, Baltimore	*Icterus galbula*
Oriole, Orchard*	*Icterus spurius*
Osprey*	*Pandion haliaetus*
Ovenbird	*Seiurus aurocapilla*
Owl, Barn	*Tyto alba*
Owl, Barred*	*Strix varia*
Owl, Eastern Screech*	*Megascops asio*
Owl, Great Horned*	*Bubo virginianus*
Owl, Northern Saw Whet	*Aegolius acadicus*
Oystercatcher, American	*Haematopus palliatus*
Parula, Northern	*Parula americana*
Pelican, American white	*Pelecanus erythrorhynchos*

FAUNA (CONTINUED)	
BIRDS (CONTINUED)	
COMMON NAME	**SCIENTIFIC NAME**
Pelican, Brown	*Pelecanus occidentalis*
Phalarope, Red-necked	*Phalaropus lobatus*
Phoebe, Eastern	*Sayomis phoebe*
Pintail, Northern	*Anus acuta*
Pipit, American	*Anthus rubescens*
Plover, America Golden	*Pluvialis dominica*
Plover, Black-bellied	*Pluvialis squatarola*
Plover, Semipalmated	*Charadrius semipalmatus*
Plover, Wilson's	*Charadrius wilsonia*
Rail, Black	*Laterallus jamaicensis*
Rail, Clapper*	*Rallus longirostris*
Rail, King*	*Rallus elegans*
Rail, Virginia	*Rallus limicola*
Rail, Yellow	*Coturnicops noveboracensis*
Redhead	*Aythya americana*
Redstart, American	*Setophaga ruticilla*
Robin, American*	*Turdus migratorius*
Sanderling	*Calidris alba*
Sandpiper, Baird's	*Calidris bairdii*
Sandpiper, Least	*Calidris minutilla*
Sandpiper, Pectoral	*Calidris melanotos*
Sandpiper, Semipalmated	*Calidris pusilla*
Sandpiper, Solitary	*Tringa solitaria*
Sandpiper, Spotted	*Actits macularius*
Sandpiper, Upland	*Bartramia longicauda*
Sandpiper, Western	*Calidris mauri*
Sapsucker, Yellow-bellied	*Sphyrapicus varius*
Scaup, Greater	*Aythya marila*
Scaup, Lesser	*Aythya affinis*
Scoter, Black	*Melanitta nigra*
Scoter, Surf	*Melanitta perspicillata*
Scoter, White-winged	*Melanitta fusca*
Shoveler, Northern	*Anas clypeata*
Shrike, Loggerhead	*Lanius ludovicianus*
Siskin, Pine	*Carduelis pinus*
Skimmer, Black	*Rynchops niger*
Snipe, Common	*Gallinago gallinago*
Sora	*Porzana carolina*
Sparrow, American Tree	*Spizella arborea*
Sparrow, Chipping	*Spizella passerina*
Sparrow, Field	*Spizella pusilla*
Sparrow, Fox	*Passerella iliaca*

FAUNA (CONTINUED)	
BIRDS (CONTINUED)	
COMMON NAME	**SCIENTIFIC NAME**
Sparrow, Grasshopper	*Ammodramus savannarum*
Sparrow, House*	*Passer domesticus*
Sparrow, Saltmarsh Sharp-tailed	*Ammodramus caudacutus*
Sparrow, Savannah	*Passerculus sandwichensis*
Sparrow, Seaside*	*Ammodramus maritimus*
Sparrow, Song	*Melospiza melodia*
Sparrow, Swamp	*Melospiza georgiana*
Sparrow, Vesper	*Pooecetes gramineus*
Sparrow, White-crowned	*Zonotrichia leucophrys*
Sparrow, White-throated	*Zonotrichia albicollis*
Starling, European*	*Stumus vulgaris*
Stilt, Black-necked	*Himantopus mexicanus*
Swallow, Barn*	*Hirundo rustica*
Swallow, Northern Rough-winged	*Stelgidopteryx serripennis*
Swallow, Tree	*Tachycineta bicolor*
Swan, Tundra	*Cygnus columbianus*
Swift, Chimney	*Chaetura pelagica*
Tanager, Scarlet	*Piranga olivacea*
Tanager, Summer	*Piranga rubra*
Teal, American Green-winged	*Anas crecca*
Teal, Blue-winged	*Anas discors*
Tern, Black	*Chlidonias niger*
Tern, Caspian	*Stema caspia*
Tern, Common*	*Stema hirundo*
Tern, Forster's*	*Stema forsteri*
Tern, Gull-billed	*Stema nilotica*
Tern, Least	*Stema antillarum*
Tern, Royal	*Stema maxima*
Tern, Sandwich	*Stema sandvicensis*
Thrasher, Brown*	*Toxostoma rufum*
Thrush, Hermit	*Catharus guttatus*
Thrush, Swainson's	*Catharus ustulatus*
Thrush, Wood*	*Hylocichla mustelina*
Titmouse, Tufted*	*Baeolophus bicolor*
Towhee, Eastern*	*Pipilo erythrophthalmus*
Turkey, Wild	*Meleagris gallopavo*
Turnstone, Ruddy	*Arenaria interpres*
Vireo, Blue-headed	*Vireo solitarius*
Vireo, Red-eyed*	*Vireo olivaceus*
Vireo, White-eyed*	*Vireo griseus*
Vireo, Yellow-throated	*Vireo flavifrons*
Vulture, Black*	*Coragyps atratus*

FAUNA (CONTINUED)	
BIRDS (CONTINUED)	
COMMON NAME	**SCIENTIFIC NAME**
Vulture, Turkey*	*Cathartes aura*
Warbler, Black-and-white	*Mniotilta varia*
Warbler, Blackburnian	*Dendroica striata*
Warbler, Blackpoll	*Dendroica fusca*
Warbler, Black-throated Blue	*Dendroica caerulescens*
Warbler, Black-throated Green	*Dendroica virens*
Warbler, Canada	*Wilsonia canadensis*
Warbler, Cape May	*Dendroica tigrina*
Warbler, Chestnut-sided	*Dendroica pensylvanica*
Warbler, Hooded*	*Wilsonia citrina*
Warbler, Magnolia	*Dendroica magnolia*
Warbler, Nashville	*Vermivora ruficapilla*
Warbler, Orange-crowned	*Vermivora celata*
Warbler, Palm AR	Dendroica palmarum
Warbler, Pine*	*Dendroica pinus*
Warbler, Prairie*	*Dendroica discolor*
Warbler, Prothonotary*	*Protonotaria citrea*
Warbler, Swainson's	*Limnothlypis swainsonii*
Warbler, Worm-eating	*Helmitheros vermivorum*
Warbler, Yellow*	*Dendroica petechia*
Warbler, Yellow-rumped	*Dendroica coronata*
Warbler, Yellow-throated*	*Dendroica dominica*
Waterthrush, Northern	*Seiurus noveboracensis*
Waxwing, Cedar	*Bombycilla cedrorum*
Whimbrel	*Numenius phaeopus*
Whip-poor-will	*Caprimulgus vociferus*
Wigeon, American	*Anas americana*
Wigeon, Eurasian	*Anas penelope*
Willet*	*Catoptrophorus semipalmatus*
Wood Pewee, Eastern*	*Contopus virens*
Woodcock, American	*Scolopax minor*
Woodpecker, Downy*	*Picoides pubescens*
Woodpecker, Hairy*	*Picoides villosus*
Woodpecker, Pileated*	*Dryocopus pileatus*
Woodpecker, Red-bellied*	*Melanerpes carolinus*
Woodpecker, Red-headed*	*Melanerpes erythrocephalus*
Wren, Carolina*	*Thryothorus ludovicianus*
Wren, House*	*Throglodytes aedon*
Wren, Marsh*	*Cistothorus palustris*
Wren, Sedge	*Cistothorus platensis*
Wren, Winter	*Troglodytes troglodytes*
Yellowlegs, Greater	*Tringa melanoleuca*

FAUNA (CONTINUED)	
BIRDS (CONTINUED)	
COMMON NAME	**SCIENTIFIC NAME**
Yellowlegs, Lesser	*Tringa flavipes*
Yellow-throat, Common*	*Geothlypis trichas*

FAUNA (CONTINUED)	
MAMMALS	
COMMON NAME	**SCIENTIFIC NAME**
Bat, Big Brown	*Eptesicus fuscus*
Bat, Eastern Pipistrelle	*Pipistrellus subflavus*
Bat, Evening	*Nycticeius humeralis*
Bat, Hoary	*Lasiurus cinereus*
Bat, Red	*Lasiurus borealis*
Bat, Silver-haired	*Lasionycteris noctivagans*
Bear, American Black	*Ursus americanus*
Beaver, American	*Castor canadensis*
Bobcat	*Lynx rufus*
Cottontail, Eastern	*Sylvilagus floridanus*
Deer, White-tailed	*Odocoileus virginianus*
Dolphin, Atlantic Bottlenosed	*Tursiops truncates*
Fox, Gray	*Urocyon cinereoargenteus*
Fox, Red	*Vulpes fulva*
Manatee	*Trichechus Manatus*
Mink, American	*Mustela vison*
Mole, Eastern	*Scalopus aquaticus*
Mole, Star-nosed	*Condylura cristata*
Mouse, Cotton	*Peromyscus gossypinus*
Mouse, Eastern Harvest	*Reithrodontomys humulis*
Mouse, Golden	*Ochrotomys nuttalli*
Mouse, House	*Mus musculus*
Mouse, White-footed	*Peromyscus leucopus*
Muskrat	*Ondatra zibethicus*
Nutria (Exotic)	*Myocastor coypus*
Opossum	*Didelphis virginiana*
Otter, River	*Lontra canadensis*
Rabbit, Marsh	*Sylvilagus palustris*
Raccoon, Northern	*Procyon lotor*
Rat, Black	*Rattus rattus*
Rat, Hispid Cotton	*Sigmodon hispidus*
Rat, Marsh Rice	*Oryzomys palustris*
Rat, Norway	*Rattus norvegicus*

Shrew, Least	*Cryptotis parva*
Shrew, Short-tailed	*Blarina brevicauda*
Shrew, Southeastern	*Sorex longirostris*
Squirrel, Eastern Gray	*Sciurus carolinensis*
Squirrel, Southern Flying	*Glaucomys volans*
Vole, Meadow	*Microtus pennsylvanicus*
Weasel, Long-tailed	*Mustela frenata*
Wolf, Red (Endangered)	*Canis rufus*

FAUNA (CONTINUED)	
REPTILES AND AMPHIBIANS	
COMMON NAME	**SCIENTIFIC NAME**
Alligator, American (Threatened)	*Alligator mississippiensis*
Amphiuma, Two-toed	*Amphiuma means*
Anole, Green (Carolina Anole)	*Anolis carolinensis*
Bullfrog	*Rana catesbeiana*
Cooter, Florida	*Chrysemys floridana floridana*
Cooter, River	*Pseudemys concinna concinna*
Copperhead	*Agkistrodon contortrix*
Cottonmouth, Eastern	*Agkistrodon piscivorus*
Frog, Brimley.s Chorus	*Pseudacris brimleyi*
Frog, Carpenter	*Rana virgatipes*
Frog, Gray Tree	*Hyla chrysoscelis (diploid form)*
Frog, Green	*Rana clamitans*
Frog, Little Grass	*Pseudacris ocularis*
Frog, Southern Cricket	*Acris gryllus*
Frog, Southern Leopard	*Rana utricularia (Rana sphenocephala)*
Kingsnake, Scarlet	*Lampropeltis triangulum elapsoides*
Lizard, Eastern Glass	*Ophisaures ventralis*
Mudpuppy, Dwarf	*Necturus punctatus*
Mudturtle, Eastern	*Kinosternon subrubrum*
Newt, Eastern	*Notophthalmus viridescens*
Peeper, Spring	*Pseudacris crucifer*
Racer, Black	*Coluber constrictor*
Rattlesnake, Canebrake (Timber)	*Crotalus horridus*
Rattlesnake, Pygmy	*Sistrusus miliarius barbouri*
Salamander, Marbled	*Ambystoma opacum*
Salamander, Slimy	*Plethodone glutinosus glutinous*
Salamander, Southern Dusky	*Desmognathus auriculatus*
Siren, Greater	*Siren lacertian*
Skink, Broad-headed	*Eumeces laticeps*
Skink, Five-Lined	*Eumeces fasciatus*
Skink, Ground	*Scincella lateralis*
Skink, Southeastern Five-lined	*Eumeces inexpectatus*
Slider, Yellow-bellied	*Trachemys scripta scripta*
Snake, Banded Water	*Nerodia fasciata fasciata*
Snake, Brown	*Storeria dekayi*
Snake, Brown Water	*Nerodia taxispilota*

Snake, Carolina Swamp	*Seminatrix pygaea paludis*
Snake, Corn (Red Rat Snake)	*Elaphe guttata*
Snake, Eastern Garter	*Thamnophis sirtalis*
Snake, Eastern Hognose	*Heterodon platirhinos*
Snake, Eastern King	*Lampropeltis getula*

FAUNA (CONTINUED)	
REPTILES AND AMPHIBIANS (CONTINUED)	
COMMON NAME	**SCIENTIFIC NAME**
Snake, Eastern Ribbon	*Thamnophis sauritus*
Snake, Glossy Crayfish	*Regina rigida*
Snake, Green Rat	*Senticolis triaspis*
Snake, Mud	*Farancia abacura*
Snake, Northern Water	*Natrix sipedon sipedon*
Snake, Rainbow	*Farancia erytrogramma*
Snake, Redbelly	*Storeria occipitomaculata*
Snake, Redbelly Water	*Nerodia erythrogaster erythrogaster*
Snake, Ringneck	*Diadophis punctatus*
Snake, Rough Earth	*Virginia striatula*
Snake, Rough Green	*Opheodrys aestivus*
Snake, Worm	*Carphophis vermis*
Spadefoot, Eastern Toad	*Scaphiopus holbrooki holbrooki*
Terrapin, Diamondback	*Malaclemys terrapin*
Toad, Eastern Narrow-mouthed	*Gastrophryne carolinensis*
Toad, Fowler's	*Bufo fowleri*
Toad, Oak	*Bufo quercicus*
Toad, Southern	*Bufo terrestris*
Treefrog, Green	*Hyla cinerea*
Treefrog, Pine Woods	*Hyla femoralis*
Treefrog, Squirrel	*Hyla squirella*
Turtle, Common Snapping	*Chelydra serpentina*
Turtle, Eastern Box	*Terrapene carolina*
Turtle, Painted	*Chrysemys picta*
Turtle, Redbelly	*Chrysemys rubiventris*
Turtle, Spotted	*Clemmys guttata*
Watersnake, Carolina	*Nerodia. Sipendon williamengelsi*

FAUNA (CONTINUED)	
FISH	
COMMON NAME	**SCIENTIFIC NAME**
Alewife	*Alosa pseudoharengus*
Anchovy, Bay	*Anchoa mitchilli*
Bass, Largemouth	*Micropterus salmoides*
Bass, Striped	*Morone saxatilis*
Bluegill	*Lepomis macrochirus*
Bowfin	*Amia calva*
Bullhead, Brown	*Ameiurus nebulosus*
Bullhead, Yellow	*Ameiurus natalis*
Carp, Common	*Cyprinus carpio*
Catfish, Channel	*Ictalurus punctatus*
Catfish, White	*Ameiurus catus*
Chubsucker, Lake	*Erimyzon sucetta*
Crappie, Black	*Pomoxis nigromaculatus*
Croaker, Atlantic	*Micropogonias undulatus*
Darter, Swamp	*Etheostoma fusiforme*
Darter, Tessellated	*Etheostoma olmstedi*
Drum, Red	*Sciaenops ocellatus*
Eel, American	*Anguilla rostrata*
Flier	*Centrarchus macropterus*
Flounder, Southern	*Paralichthys lethostigma*
Flounder, Summer	*Paralichthys dentatus*
Gar, Longnose	*Lepisosteus osseus*
Goby, Green	*Microgobius thalassinus*
Goby, Naked	*Gobiosoma bosci*
Goldfish	*Carassius auratus*
Herring, Blueback	*Alosa aestivalis*
Hogchoaker	*Trinectes maculatus*
Killifish, Banded	*Fundulus diaphanus*
Killifish, Rainwater	*Lucania parva*
Ladyfish	*Elops Saurus*
Madtom, Tadpole	*Noturus gyrinus*
Menhaden, Atlantic	*Brevoortia tyrannus*
Minnow, Sheepshead	*Cyprinodon variegates*
Mosquitofish	*Gambusia affinis*
Mudminnow, Eastern	*Umbra pygmaea*
Mullet, Striped	*Mugil cephalus*
Mullet, Yellow	*Mugil curema*
Mummichog	*Fundulus h. heteroclitus*
Needlefish, Atlantic	*Strongylura marina*
Perch, Pirate	*Aphredoderus sayanus*
Perch, Silver	*Bairdiella chrysoura*

FAUNA (CONTINUED)	
FISH (CONTINUED)	
COMMON NAME	**SCIENTIFIC NAME**
Perch, White	*Morone americana*
Perch, Yellow	*Perca flavescens*
Pickerel, Chain	*Esox niger*
Pickerel, Redfin	*Esox americanus*
Pinfish	*Lagodon rhomboids*
Pumpkinseed	*Lepomis gibbosus*
Shad, American	*Alosa sapidissima*
Shad, Gizzard	*Dorosoma cepedianum*
Shad, Hickory	*Alosa mediocris*
Shiner	*Notropis spp.*
Shiner, Golden	*Notemigonus crysoleucas*
Silverside, Inland	*Menidia beryllina*
Skilletfish	*Gobiesox strumosus*
Spot	*Leiostomus xanthurus*
Sturgeon, Atlantic	*Acipenser oxyrhynchus*
Sunfish, Banded	*Enneacanthus obesus*
Sunfish, Bluespotted	*Enneacanthus gloriosus*
Sunfish, Mud	*Acantharchus pomotis*
Sunfish, Redbreast	*Lepomis auritus*
Sunfish, Redear	*Lepomis microlophus*
Swampfish	*Chologaster cornuta*
Tonguefish, Blackcheek	*Symphurus plagiusa*
Trout, Spotted Sea	*Cynoscion nebulosus*
Warmouth	*Lepomis gulosus*
FAUNA (CONTINUED)	
OTHER AQUATIC ORGANISMS	
COMMON NAME	**SCIENTIFIC NAME**
Crab, Blue	*Callinectes sapidus*
Crab, Brackish-Water Fiddler	*Uca minax*
Crayfish	*Procambarus acutus*
Oyster, Common	*Crassostrea virginica*
Periwinkle, Marsh	*Littorina irrorata*
Shrimp, Brown	*Penaeus aztecus*
Shrimp, Freshwater	*Palaemonetes paludosus*
Shrimp, Pink	*Penaeus duorarum*
Shrimp, White	*Penaeus setiferus*

Appendix J. Budget Requests

SWANQUARTER NATIONAL WILDLIFE REFUGE

Project ranks are listed for Swanquarter NWR. Projects are listed as tier 1 projects that support approved critical mission or approved minimum staff or tier 2 projects that do not. There are also projects proposed in the CCP for Mattamuskeet NWR that would support the administration of Swanquarter NWR.

REFUGE OPERATIONS NEEDS SYSTEM (RONS)

FISH AND WILDLIFE POPULATION, HABITAT MANAGEMENT

Project: 97015
First Year Request: $65,000, Recurring Request: $95,000
Station Rank – 2 (Swanquarter Tier 1)
Provide an assistant refuge manager to coordinate the day-to-day management, administration, and protection of refuge facilities and biological resources on the 16,400-acre coastal refuge. The refuge is currently unstaffed and is administered by Mattamuskeet NWR staff. The refuge and associated 27,000-acre Presidential Proclamation Area, which is closed to migratory bird hunting, provide habitat for waterfowl and other migratory birds, alligators, red wolves, bald eagles, black bear, and a variety of commercially and recreationally important coastal fish. An assistant refuge manager will provide the professional guidance needed for refuge's biological, maintenance, public use, and outreach programs. This position will also be responsible for planning, coordinating, and conducting the fire management program for the entire 81,000-acre Mattamuskeet NWR Complex (Mattamuskeet, Cedar Island, and Swanquarter NWRs).

Project: 97035
First Year Request: $65,000, Recurring Request: $68,000
Station Rank – 7 (Swanquarter Tier 1)
Provide a wildlife biologist (aquatic/wetland ecologist) to conduct habitat monitoring studies and implement biological management programs on the 16,400-acre coastal refuge. The refuge is currently unstaffed and is administered by Mattamuskeet NWR staff. The refuge is dominated by a vast expanse of undisturbed coastal marsh and islands. The refuge and associated 27,000-acre Presidential Proclamation Area, which is closed to migratory bird hunting, as well as the 8,785-acre Class 1 Wilderness Area, provide habitat for waterfowl and other migratory birds, alligators, red wolves, bald eagles, black bear, and a variety of commercially and recreationally important coastal fish, crabs, and shellfish. The wildlife biologist will plan, conduct, and coordinate studies (with an emphasis on wetland and aquatic habitats) to include the following: vegetation inventories; nutrient status studies; sea grass bed mapping surveys; impact to sea grass bed evaluations in Presidential Proclamation waters; ozone damage to vegetation assessments, and biotic inventories. None of this information is known, but is needed to protect the quality and integrity of the refuge's wilderness area, other refuge lands, and surrounding coastal waters.

Project: 97001
First Year Request: $65,000, Recurring Request: $68,000
Station Rank – 8 (Swanquarter Tier 1)
Provide a wildlife biologist to improve biological monitoring of habitats and wildlife populations on the 16,400-acre coastal refuge and two nearby refuges (50,180-acre Mattamuskeet NWR and 14,480-acre Cedar Island NWR). The refuge is currently unstaffed and is administered by Mattamuskeet NWR staff. The refuge is dominated by a vast expanse of undisturbed coastal marsh and islands, which provides habitat for waterfowl and other migratory birds, alligators, red wolves, bald eagles, black bear, and a variety of commercially and recreationally important coastal fish. A wildlife biologist is needed to coordinate and conduct wildlife and habitat surveys identified in refuge inventory and monitoring plans. These surveys include water quality monitoring; fish and aquatic surveys; vegetation surveys; waterfowl, songbird, and shorebird surveys; and alligator and black bear surveys. Surveying and monitoring are essential to making sound resource management decisions. This position will also assist with the biological programs on Mattamuskeet and Cedar Island NWRs.

Project: 00014
First Year Request: $65,000, Recurring Request: $68,000
Station Rank – 1 (Swanquarter Tier 2)

Improve wildlife and habitat management programs on Swanquarter NWR. A biological technician will be hired to oversee and conduct habitat and wildlife management programs. This position will implement and monitor biological programs that will benefit wildlife, fisheries and habitat. This refuge has not been staffed for over 13 years, and needs attention to the biological programs.

RESOURCE PROTECTION

Project: 00002
First Year Request: $65,000, Recurring Request: $74,000
Station Rank – 6 (Swanquarter Tier 1)
Provide a refuge law enforcement officer to improve protection of refuge resources, facilities, and visitors on the 16,400-acre coastal refuge. The refuge is currently unstaffed and is administered by Mattamuskeet NWR staff. This coastal refuge, and associated 27,000-acre Presidential Proclamation Area, which is closed to migratory bird hunting, as well as the 8,785-acre Class 1 Wilderness Area, provide habitat for waterfowl and other migratory birds, alligators, red wolves, bald eagles, black bear, and a variety of commercially and recreationally important coastal fish, crabs, and shellfish. It also has a 1,000-foot fishing pier on the Bell Island portion of the refuge. This pier, along with other portions of the refuge, is extensively used by visitors for saltwater fishing and wildlife observation. About 85,000 people visit the refuge each year. Only a small area of the refuge is accessible by vehicle, but other areas are readily accessible by boat. A full-time law enforcement officer is needed to enhance resource and visitor protection, especially during migratory bird seasons and at high public use sites (fishing pier), the closed-to-hunting Presidential Proclamation Area, and the designated Wilderness Area. This position will also post and maintain refuge boundary signs in the water boundary areas of the refuge and will assist with law enforcement activities at Mattamuskeet and Cedar Island NWRs.

Project: 00019
First Year Request: $108,000, Recurring Request: $0
Station Rank – 9 (Swanquarter Tier 1)
Conduct a comprehensive cultural resources survey on the 16,400-acre coastal marsh and island refuge. In 1979, a limited cultural resource survey was conducted at sites that had been identified for planned development (public use facilities, structures). Findings from this survey indicated the need

to conduct a more comprehensive survey of the remaining areas of the refuge. This refuge is located in an area rich in significant prehistoric, Native American, and early European colonial history. This area of North Carolina, starting in the early 16th century, was the site of early European exploration and colonization, including nearby Roanoke Island, which is the site of the first English colony in America and the site of the famous "Lost Colony." This project will help determine if significant cultural resource sites are present on the refuge. All sites identified by the survey will be mapped and protected from vandalism or unintentional damage (from refuge operations, proposed construction projects, and other activities that would have the potential to impact the sites).

VISTIOR SERVICES

Project: 97026
First Year Request: $65,000, Recurring Request: $81,000
Station Rank – 3 (Swanquarter Tier 1)
Provide a visitor services specialist (public use and outreach specialist) to improve recreational, interpretive, environmental education, and outreach programs on the refuge and on two nearby refuges (50,180-acre Mattamuskeet NWR and 14,480-acre Cedar Island NWR). This 16,400-acre coastal refuge is currently unstaffed and is administered by Mattamuskeet NWR staff. A strong, coordinated public use and outreach program will greatly enhance public support of the refuges, increase the publics awareness of wildlife and environmental issues on the refuges and in the ecosystem, and help achieve public use and outreach goals. This position will coordinate and integrate the public use and outreach programs on the three refuges, which are visited by over 180,000 people annually. The visitor services specialist will also coordinate partnership efforts with the Friends of the Mattamuskeet Lodge Committee and the Partnership for the Sounds group to reach public use and outreach goals in the area.

REFUGE ADMINISTRATION

Project: 97034
First Year Request: $65,000, Recurring Request: $57,000
Station Rank – 1 (Swanquarter Tier 1)
Provide an administrative technician (receptionist/clerk typist) to assist with the increase demand for public and visitor services. The 16,400-acre coastal refuge is currently unstaffed and is administered by Mattamuskeet NWR staff, which has only one office assistant. Currently, this office assistant must handle an ever increasing demand for services from the public and refuge visitors for three refuges. Therefore, other administrative duties (purchasing, paying bills, personnel actions, payroll, budget tracking, property management) are not being completed in a timely manner. The addition of a receptionist/clerk typist will improve office efficiency (typing and filing routine correspondence) and public/visitor relations (prompt visitor reception and faster processing of requests for information). This project will allow the primary office assistant to concentrate on core job responsibilities that are of a time critical nature.

Project: 00013
First Year Request: $65,000, Recurring Request: $66,000
Station Rank – 4 (Swanquarter Tier 1)
Provide a maintenance worker to improve maintenance and repairs to refuge equipment and facilities on the 16,400-acre coastal refuge. The refuge is currently unstaffed and is administered by Mattamuskeet NWR staff. The refuge is dominated by a vast expanse of undisturbed coastal marsh and islands, which includes a 27,000-acre Presidential Proclamation Area, which is closed to migratory bird hunting, and an 8,785-acre Class 1 Wilderness Area. It also has a 1,000-foot fishing pier on the Bell Island portion of the refuge. To support the management of refuge resources and

programs, a maintenance worker is needed to conduct maintenance and repair on a wide variety of refuge equipment (boats, trailers, motors, vehicles, marsh buggies) and facilities (fishing pier, boundary signs and posts, roads, and trails). This position will conduct an aggressive preventive and cyclic maintenance operation. This will help reduce the premature replacement of costly equipment and facilities located in a harsh coastal environment.

Project: 00015
First Year Request: $32,500, Recurring Request: $33,000
Station Rank – 5 (Swanquarter Tier 1)
Provide a maintenance worker (tractor operator) to enhance the maintenance of facilities on the 16,400-acre coastal refuge. The refuge is currently unstaffed and is administered by Mattamuskeet NWR staff. The refuge is dominated by a vast expanse of undisturbed coastal marsh and islands. This position will primarily operate farm tractors, mowers, boats, and marsh buggies to maintain refuge roads, trails, fire breaks, a 1,000-foot long fishing pier, and other facilities. The maintenance worker will also perform preventive and cyclic maintenance and repairs on the equipment. This position directly supports the implementation of the refuge's biological, fire, and public use programs.

Swanquarter National Wildlife Refuge
Refuge Operation Needs System (RONS) Projects Listed by Tier and Station Rank

Station Rank	Project Number	Cost (First Year, Recurring)	Positions	Project Title
Tier 1				
1	97034	$65,000 $57,000	1.0	Improve Office Efficiency and Public Relations (Administrative Technician)
2	97015	$65,000 $95,000	1.0	Improve Management and Protection (Assistant Refuge Manager)
3	97026	$65,000 $81,000	1.0	Improve Recreational and Public Use Activities (Visitor Services Specialist)
4	00013	$65,000 $66,000	1.0	Improve Equipment and Facility Maintenance (Maintenance Worker)
5	00015	$32,500 $33,000	0.5	Improve Refuge Management Capabilities (Maintenance Worker)
6	00002	$65,000 $74,000	1.0	Enhance Resource and Visitor Protection (Law Enforcement Officer)
7	97035	$65,000 $68,000	1.0	Conduct Habitat Monitoring Studies (Wildlife Biologist)
8	97001	$65,000 $68,000	1.0	Improve Biological Monitoring on Three Refuges (Wildlife Biologist)
9	00019	$108,000 $0	0.0	Conduct a Comprehensive Cultural Resource Survey
Un-ranked	Not entered	$50,000 $0	0.0	Develop an Interpretive Trail or Boardwalk.
TIER 2				
1	00014	$65,000 $68,000	1.0	Improve Habitat and Wildlife Management Programs (Biological Technician)

MAINTENANCE MANAGEMENT SYSTEM (MMS) PROJECTS

MMS Projects Organized by Rank			
Rank	**Number**	**Description**	**Cost**
1	99012	Resurvey and Post Swanquarter Proclamation Boundary	$60,000
2	99004	Resurvey Boundary line along East Juniper Bay Tract	$37,000

Appendix K. List of Preparers

OVERVIEW

This appendix summarizes the consultation and coordination that has occurred to date in identifying the issues, alternatives, and proposed alternative, which are presented in this Draft CCP/EA. It lists the meetings that have been held with the various agencies, organizations, and individuals who were consulted in the preparation of the Draft CCP/EA.

The Service formed a planning core team composed of representatives from various Service divisions to prepare the Draft CCP/EA (Table 21). Initially, the team focused on identifying the issues and concerns pertinent to refuge management. The team met on several occasions from December 2000 to June 2002. A biological review team (Table 22) met on the refuges in the ecosystem four times between December 1999 and December 2000 to assess the habitats on the refuges and the needs of wildlife species in the ecosystem, and make recommendations on land management and acquisition needs. The core team also sought the contributions of experts (Table 23) from various fields.

Table 21. Swanquarter NWR comprehensive conservation core planning team members

Name and Title	Station, Refuge, Location
Bruce Freske, Refuge Manager Jerry Fringeli, Assistant Manager Chris Smith, Law Enforcement Officer Don Temple, Former Manager John Stanton, Former Wildlife Biologist Dan Sheill, Former Law Enforcement Officer	Mattamuskeet National Wildlife Refuge U.S. Fish and Wildlife Refuge Swan Quarter, North Carolina
Robert Glennon, Former Natural Resource Planner David Brown, Former Habitat Protection Biologist	Ecosystem Planning Office U.S. Fish and Wildlife Service Edenton, North Carolina

Table 22. Swanquarter NWR comprehensive conservation biological review team members

Name and Title	Station, Refuge, Location
Bob Noffsinger, Former Supervisory Wildlife Management Biologist	Migratory Bird Field Office, U.S. Fish and Wildlife Service, Manteo, North Carolina
Frank Bowers, Former Migratory Bird Coordinator	Southeast Regional Office, U.S. Fish and Wildlife Service, Atlanta, Georgia
Chuck Hunter, Former Nongame Migratory Bird Coordinator	Southeast Regional Office, U.S. Fish and Wildlife Service, Atlanta, Georgia
Ronnie Smith, Fisheries Biologist	Fisheries Assistance Office U.S. Fish and Wildlife Service Edenton, North Carolina
John Stanton, Former Wildlife Biologist	Mattamuskeet National Wildlife Refuge U.S. Fish and Wildlife Service Swan Quarter, North Carolina
Wendy Stanton, Wildlife Biologist	Pocosin Lakes National Wildlife Refuge U.S. Fish and Wildlife Service Columbia, North Carolina
Dennis Stewart, Wildlife Biologist	Alligator River National Wildlife Refuge U.S. Fish and Wildlife Service Manteo, North Carolina
Ralph Keel, Former Wildlife Biologist	Great Dismal Swamp National Wildlife Refuge U.S. Fish and Wildlife Service Suffolk, Virginia
John Gallegos, Wildlife Biologist	Back Bay National Wildlife Refuge U.S. Fish and Wildlife Service Virginia Beach, Virginia
David Allen, Nongame Wildlife Biologist	North Carolina Wildlife Resources Commission New Bern, North Carolina

Table 23. Expert contributors to the Swanquarter NWR Draft CCP/EA and their area(s) of expertise

Expert	Area of Expertise
Bill Grabill, Former Refuge Supervisor, U.S. Fish and Wildlife Service, Atlanta, Georgia	Refuge Management
Rufus Croom, District Conservationist USDA, Natural Resources Conservation Service Plymouth, North Carolina	Soil and Water Conservation Federal Land Conservation Programs
John Gagnon, Soil Scientist USDA, Natural Resources Conservation Service Edenton, North Carolina	Soil Science
Kevin Moody, Former NEPA Specialist U.S. Fish and Wildlife Service, Atlanta, Georgia	National Environmental Policy Act
John Ann Shearer, Private Lands Biologist, U.S. Fish and Wildlife Service, Raleigh, North Carolina	Wetland Management, Partners for Fish and Wildlife Program
Richard Kanaski, Regional Archeologist, U.S. Fish and Wildlife Service, Savannah, Georgia	Cultural Resources

Appendix L. Draft Coastal Zone Consistency Determination

The following discussion is taken from the website of the Division of Coastal Management of the North Carolina Department of Environment and Natural Resource – http://www.nccoastalmanagement.net/Permits/consist.htm:

Because North Carolina's Coastal Management Program is Federally approved, a number of activities are required to comply with the enforceable policies of the State's certified coastal management program – even if those activities do not require CAMA permits under State law.

This "Federal consistency" authority exists under the Federal Coastal Zone Management Act. The Coastal Zone Management Act (CZMA) was enacted on October 27, 1972, to encourage coastal States, such as North Carolina, to develop comprehensive programs to manage and balance competing uses of and impacts to coastal resources. It applies to any activity that is within the State's coastal zone that may reasonably affect any coastal resource or coastal use within the State's coastal zone (even if the activity occurs outside of the coastal zone), if the activity:

- is a Federal activity
- requires a Federal license or permit;
- receives Federal money; or
- is a plan for exploration, development or production from any area leased under the Outer Continental Shelf Lands Act.

Such projects must comply with the key elements of North Carolina's Coastal Management Program, which include:

- the Coastal Area Management Act (CAMA)
- the State's Dredge and Fill Law
- Chapter 7 of Title 15A of N.C.'s Administrative Code
- regulations passed by the Coastal Resources Commission (CRC)
- local land-use plans certified by the CRC; and
- a network of other state agencies' laws and regulations.

Consistency review by the Division of Coastal Management covers a wide range of projects, such as: proposed wetland fill that requires an Individual Permit from the U.S. Army Corps of Engineers; expansion of military operations and facilities; acquisition and expansion of Federal wildlife refuges; channel-maintenance dredging projects; and public projects such as highways, and water and sewer lines.

How a consistency decision is made

The consistency review process, for simplicity, can be divided into two classifications, one for Federal activities and the other for Non-Federal projects that require a Federal permit and/or license.

Federal agencies proposing an activity that can reasonably affect a coastal resource or a coastal use are required to submit to DCM a "CONSISTENCY DETERMINATION."…. The State has sixty (60) days to review a consistency determination. The procedures for making such a submission are contained in Subpart "C" of 15 CFR 930.

Upon receiving a consistency certification submission, DCM will evaluate it for completeness. Please note, that DCM may not file a consistency submission complete until the applications for other required State permits have also been filed complete by the other reviewing State agencies. If the consistency submission is determined to be complete, DCM will review the proposed project for conformance with the enforceable policies of the State's certified coastal management program. As part of this review process, the proposed project is circulated to the public and a variety of State agencies for comment. When the public review period is completed, DCM will consider the comments received. Moreover, please be aware that DCM will not make a final decision on the proposed project until the applicant submits copies of all other required State permits, for example a Section 401 Water Quality Certification and/or Erosion and Sedimentation Control Plan. Upon reaching its decision on the proposed project, DCM will issue either a letter of "concurrence" or "objection".

In the event that a letter of "objection" is issued, DCM and the project proponent may still negotiate a resolution that would allow the project to go forward. Additionally, the project proponent may be entitled to certain mediation/appeal privileges with the Office of Coastal Resource Management (OCRM). OCRM is the Federal agency responsible for overseeing the Coastal Zone Management Act. As such OCRM is responsible for issuing regulations on the consistency process, mediating consistency disputes, and processing consistency appeals to the Secretary of Commerce.

Mattamuskeet National Wildlife Refuge
38 Mattamuskeet Road
Swanquarter, NC 27885

Stephen Rynas
Federal Consistency Coordinator
North Carolina Division of Coastal Management
400 Commerce Avenue
Morehead City, NC 28557-3421

Dear Mr. Rynas :

Swanquarter National Wildlife Refuge has prepared a Comprehensive Conservation Plan as mandated by the National Wildlife Refuge System Improvement Act of 1997. The plan outlines refuge management for the next 15 years. The plan does not propose any specific development activity, but is subject to a Federal consistency determination because the planning process is a Federal activity and expends Federal funds.

In accordance with Section 307(c)(1) of the Federal Coastal Zone Management Act of 1972 as amended, the Swanquarter National Wildlife Refuge has determined that the plan is consistent with the enforceable portion of North Carolina's approved coastal management program. The determination is based on a review of the conformance of the proposed management in the plan with the enforceable policies of the State's coastal program, which are principally found in Chapter 7 of Title 15A of North Carolina's Administrative Code. The details of the consistency determination have been provided through the submission of the attached supporting narrative and the Draft Comprehensive Conservation Plan and Environmental Assessment.

Swanquarter National Wildlife Refuge requests that the Division of Coastal Management concur with the consistency determination.

Sincerely,

Bruce Freske
Refuge Manager

Enclosures:
Supporting Narrative
Swanquarter National Wildlife Refuge Draft Comprehensive Conservation Plan and Environmental Assessment

NORTH CAROLINA COASTAL MANAGEMENT PROGRAM
FEDERAL CONSISTENCY DETERMINATION FOR
SWANQUARTER NATIONAL WILDLIFE REFUGE
COMPREHENSIVE CONSERVATION PLAN

Background

The National Wildlife Refuge System Improvement Act of 1997 requires all national wildlife refuges to prepare a comprehensive conservation plan to guide their management for a 15-year planning horizon. The Swanquarter National Wildlife Refuge in Hyde County, North Carolina was established in 1932. The Refuge was established and the land was acquired by the authority of the Migratory Bird Conservation Act of 1929. The refuge currently owns 16,411 acres.

The comprehensive conservation plan outlines management including monitoring of fish and wildlife populations, monitoring and management of habitats, provision of opportunities for public uses (hunting, fishing, environmental education, interpretation, wildlife observation, and wildlife photography), resource protection (law enforcement, special use permits, water quality monitoring, pest plant and animal management), and administration. The specifics of the management activities will be outlined in step-down plans that will be developed after the comprehensive conservation plan is approved. The major activities on the refuge at the present time are monitoring waterfowl and vegetation, conducting prescribed burning to mimic the natural fire cycle, hunting, fishing, wildlife observation and photography, law enforcement, and maintenance of existing roads and facilities.

Federal Consistency with the North Carolina Coastal Management Program

Areas of Environmental Concern

The Swanquarter National Wildlife Refuge contains coastal wetlands that are in the Estuarine and Coastal Area of Environmental Concern (estuarine and ocean system, ocean hazard system, and public water supply) mentioned in the CAMA Handbook for Development in Coastal North Carolina. More than ninety-nine percent of the refuge (16,400 of 16,411 acres) is wetlands; seventy-five percent (12,300 acres) is estuarine marsh.

The comprehensive conservation plan is consistent with the following section of Subchapter 7H of the Guidelines for the Estuarine and Ocean Systems:

Section .0205 – Coastal Wetlands – The management objectives in the comprehensive conservation plan of the Swanquarter National Wildlife Refuge are similar to the management objective for coastal wetlands. The refuge staff proposes to manage the wetlands to maintain the vegetation and wildlife characteristic of those wetlands. They will conduct prescribed burning with the standards established by the state of North Carolina. They will maintain the existing roads.

Projects Outside the Areas of Environmental Concern

Twenty-five percent of the Swanquarter National Wildlife Refuge (4,111 of 16,411 acres) is not within an Area of Environmental Concern. The comprehensive conservation plan is consistent with the following sections of Subchapter 7M of the General Policy Guidelines for the Coastal Area:

Section .0200 – Shoreline Erosion Policies – The comprehensive conservation plan of the Swanquarter National Wildlife Refuge does not propose any activities that will disturb land, drain land, or increase runoff from land that would increase shoreline or riverbank erosion. The forest management step-down plan may propose the harvesting or thinning of the forest to improve wildlife habitat. That management would be performed in accordance with Best Management Practices prescribed by the North Carolina Division of Forest Resources.

Section .0300 – Shoreline Access Policies – The comprehensive conservation plan of the Swanquarter National Wildlife Refuge proposes to maintain access for the public to hunt, fish, observe wildlife, photograph wildlife, and participate in environmental education and interpretation programs. There are maintained gravel roads on the refuge with access from public roads.

Section .0800 – Coastal Water Quality Policies - The comprehensive conservation plan of the Swanquarter National Wildlife Refuge does not propose any intensive management that would disturb soil, increase runoff, or apply fertilizer or pesticide on the refuge. The forest management step-down plan may propose the harvesting or thinning of the forest and/or the use of pesticides to kill undesirable trees and shrubs to improve wildlife habitat. That management would be performed in accordance with Best Management Practices prescribed by the North Carolina Division of Forest Resources and the pesticide labels.

Conclusion

The Comprehensive Conservation Plan for the Swanquarter National Wildlife Refuge will not result in any significant impacts to coastal resources. The plan deals primarily with monitoring wildlife populations and providing opportunities for public use (hunting, fishing, environmental education, interpretation, wildlife observation, and wildlife photography). The plan also provides for habitat monitoring and management of the habitat to improve conditions for wildlife. The proposed management is consistent, to the maximum extent practicable, with the enforceable policies of North Carolina's coastal management program. If you have any questions, please contact Bruce Freske, Refuge Manager, at 252-926-4021.