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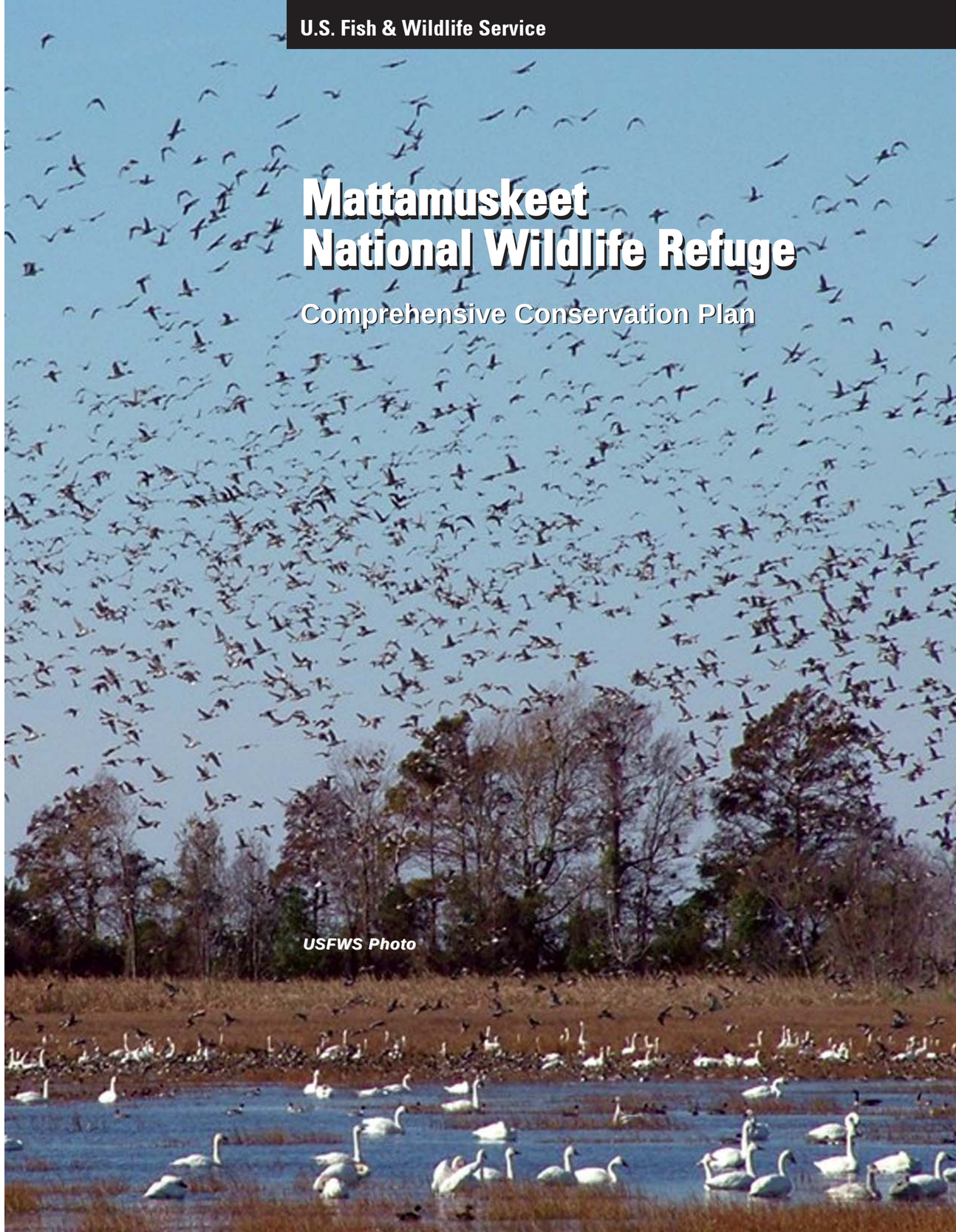
December 2008

Mattamuskeet National Wildlife Refuge Comprehensive Conservation Plan

U.S. Fish & Wildlife Service

Mattamuskeet National Wildlife Refuge

Comprehensive Conservation Plan



Comprehensive Conservation Plans provide long-term guidance for management decisions; set forth goals, objectives, and strategies needed to accomplish refuge purposes; and identify the Fish and Wildlife Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

Mattamuskeet National Wildlife Refuge

Comprehensive Conservation Plan

U.S. Department of the Interior
Fish and Wildlife Service
Southeast Region

December 2008

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COMPREHENSIVE CONSERVATION PLAN

MATTAMUSKEET NATIONAL WILDLIFE REFUGE

Hyde County, North Carolina

U.S. Department of the Interior
Fish and Wildlife Service

Southeast Region
Atlanta, Georgia

Decem**ber 2008**

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Executive Summary

The U.S. Fish and Wildlife Service (Service) has prepared this comprehensive conservation plan (CCP) to guide the management of Mattamuskeet National Wildlife Refuge in Hyde County, North Carolina. The plan outlines the refuge's programs and corresponding resource needs for the next 15 years, as mandated by the National Wildlife Refuge System Improvement Act of 1997.

Before the Service began preparing this CCP, it conducted a biological review of the refuge's wildlife and habitat management program and a visitor services review of the refuge's efforts to accommodate public use. At the outset of the CCP process, the Service conducted public scoping meetings to solicit public opinions on the issues the plan should address. The biological review team was composed of biologists from federal and state agencies and nongovernmental organizations that have an interest in the refuge. The visitor services review team consisted of Service personnel with expertise in public use. The refuge staff held several public scoping meetings to solicit public input on the issues, concerns, and opportunities that should be addressed in the CCP. Also, a 30-day public review and comment period of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) was provided.

The Service developed and analyzed three management alternatives. Alternative A represented the status quo, that is, no change from current management. Under this alternative, the refuge would continue to furnish habitat and sanctuary during the fall and winter for 20–30 percent of North Carolina's tundra swans; 40,000–60,000 northern pintails and American green-winged teal; 5,000 Canada geese (Atlantic population); and 40,000–60,000 other ducks, including 2,000–4,000 black ducks. Management of resident wildlife and fish in collaboration with partners would continue, including winter counts of bald eagles, Christmas bird counts, reptile and amphibian studies, and the red wolf recovery program.

Under Alternative A, existing habitats would also be maintained, including 40,276 acres of open water; 2,300 acres of freshwater marsh; 2,000 acres in 12 moist soil units; 572 acres of three forested impoundments; 1,300 acres of mixed pine hardwood; 1,000 acres of wet pine flatwoods; 266 acres of nonimpounded cypress gum swamp; 191 acres of corn and soybean cropland; and 189 acres in the Conservation Reserve Program (CRP). Refuge resources would be protected by limiting the negative impacts of human activity and invasive species on and around the refuge.

Alternative A would continue the range of visitor services without the guidance of an overall visitor services plan for all six priority public uses, including deer and waterfowl hunting; fishing; environmental education; interpretation; and wildlife observation and photography. By 2010, a new refuge headquarters/visitor contact station would be constructed along with a new maintenance workshop, while replacing two staff houses.

Alternative B, the refuge's preferred alternative, enhances or slightly expands various aspects of Alternative A. For wintering waterfowl under Alternative B, the objectives for tundra swans and northern pintails are the same, but the Canada goose objective is 5,000 higher and the duck objective is 40,000 to 60,000 higher. Alternative B would replicate most elements and expand upon other aspects of Alternative A's fisheries management.

Alternative B would also expand Alternative A's management of raptors, passerine birds, shorebirds, marsh and wading birds, mammals, and reptiles and amphibians. It would reinitiate nest counts of ospreys, ground surveys for marsh and wading birds, and implement passerine point counts. It would

also evaluate alternative management strategies for moist soil units as to their benefit for spring and fall migration of shorebirds.

Alternative B expands on Alternative A's habitat objectives. It would investigate the desirability and feasibility of restoring Salyer's Ridge pinewoods and consider new management options for the CRP cropland. Alternative B would expand resource protection by increasing control of invasive plant and animal species such as common reed, alligatorweed, and nutria. The refuge would also prepare and begin to implement a Cultural Resources Management Plan. To enhance law enforcement, the refuge would obtain one full-time equivalent (FTE) law enforcement officer dedicated solely to the Mattamuskeet Refuge.

To better support public use, under Alternative B, the refuge would prepare and implement a Visitor Services Plan. Existing hunts would continue and the refuge would explore how to increase youth hunting opportunities for deer and waterfowl and cooperate with the North Carolina Wildlife Resources Commission to conduct activities promoting hunter recruitment and retention. Fishing opportunities would increase by adding one boat ramp to support an additional 5,000 angler visits annually. Nature Week would be reinstituted and the refuge would begin to host ten K-12 school programs annually. Interpretation opportunities would be expanded by adding kiosks, annually revised brochures, and interpretive signage along the wildlife drive and New Holland boardwalk trail. Opening and staffing the visitor contact station with volunteer(s) on weekends would also promote further interpretation. Alternative B would reinstall an eight-mile canoe and kayak loop trail and construct one additional photoblind. Like Alternative A, the refuge would cooperate with partners to encourage commercial ecotours. The refuge would also increase it outreach efforts.

Alternative C represented a moderate expansion over the refuge's existing program; it was also somewhat more expansive than Alternative B, the Service's preferred alternative. For wintering waterfowl, the objectives for tundra swan and northern pintail were the same as Alternative B, but the Canada goose objective is 5,000 higher and the duck objective 80,000 to 120,000 higher under Alternative C than Alternative B. Alternative C would aim for the same objectives as Alternative B in other aspects of wildlife and fisheries management. However, Alternative C generally proposed more studies and surveys than Alternative B.

Alternative C's habitat management objectives were identical to Alternative B's and quite similar to Alternative A's. Alternative C would replicate Alternative B's resource protection objectives, but in addition, would install and maintain one or more remote automated water quality monitoring devices/stations and further increase control of invasive species, including monitoring for the presence of kudzu and feral swine.

Alternative C provided increased visitor services over those offered by the first two alternatives, and increases in each of the six priority public uses. Like Alternative B, visitor services would be under the guidance of a Visitor Services Plan. A Park Ranger would annually offer 30 interpretive programs, including offering or hosting interpreted kayak excursions. The refuge would further expand outreach by increasing off-refuge programs, news releases, and website updates.

The Service selected Alternative B as its preferred alternative. This choice is reflected in the comprehensive conservation plan. While each of the three alternatives offered benefits for wildlife, habitat, and public use, Alternative B was more ambitious than Alternative A and more feasible and realistic than Alternative C.

I. Background

INTRODUCTION

The U.S. Fish and Wildlife Service (Service) has developed this Comprehensive Conservation Plan (CCP) for Mattamuskeet National Wildlife Refuge to guide the refuge's management actions and direction for the next 15 years. 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. The draft of this plan was made available to state and federal government agencies, conservation partners, and the general public for review and comment. All comments from this public review were considered in the development of this comprehensive conservation plan, which describes the Service's preferred plan.

PURPOSE AND NEED FOR THE PLAN

The purpose of the CCP is to develop a proposed action that best achieves the refuge purpose; attains the vision and goals developed for the refuge; contributes to the mission of the National Wildlife Refuge System; addresses the refuge's 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 the refuge's management direction;
- provide refuge neighbors, visitors, and government officials with an understanding of the Service's management actions on and around the refuge;
- ensure that the Service's 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 development of the refuge's budget requests for operations, maintenance, and capital improvement needs.

U.S. FISH AND WILDLIFE SERVICE

The U.S. Fish and Wildlife 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 with 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 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 National Wildlife Refuge System Improvement Act of 1997 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 comprehensive conservation plans 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 Act, approved CCPs will serve as the guidelines for refuge management for the next 15 years. The 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 the requirement of developing a comprehensive conservation plan for each unit of the Refuge System and fully involve the public in the preparation of these plans;
- maintain the biological integrity, diversity, and environmental health of the Refuge System;
- 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
- retain the authority of refuge managers to determine compatible public uses.

The following are just a few examples of the Service's 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 overhunting, competition with cattle, and natural disasters decimated the once-abundant herds. The drought conditions of the Dust Bowl during the 1930s 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) – 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, the surrounding communities benefited with $4.43 in recreation expenditures and $1.42 in job-related income (Caudill and Laughland 2003).

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 are to be prepared in consultation with adjoining federal, state, and private landowners and that the Service develop and implement a process to ensure active public involvement in their preparation and revision (every 15 years).

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 (Refuge System), congressional legislation, rresidential 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 Refuge System and management of the Mattamuskeet NWR 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 Mattamuskeet NWR and other partners, such as the North Carolina Wildlife Resources Commission (NCWRC) and private landowners.

Lands within the 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 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, role of the refuge 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 CCP.

This CCP 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, nongovernmental 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. The plan's 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 nongame land birds. Nongame land birds have been vastly underrepresented in conservation efforts, and many are exhibiting significant declines. This plan is voluntary and nonregulatory, 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.

North 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 National Wildlife Refuge System 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 sustainment of fish and wildlife species in the State of North Carolina.

In North Carolina, the Service partners with the North Carolina Wildlife Resources Commission (NCWRC). The NCWRC is charged with enforcement responsibilities for migratory birds and endangered species, as well as managing the state's natural resources. It also manages approximately 1.8 million acres of game lands in North Carolina.

The NCWRC coordinates the state's wildlife conservation program and provides public recreation opportunities, including an extensive hunting and fishing program, on several game lands and from several boat ramps located in Hyde County. NCWRC's participation and contribution throughout this comprehensive conservation planning process has been valuable, and it is continuing its work with the Service to provide ongoing opportunities for an open dialogue with the public to improve the condition of fish and wildlife populations in coastal North Carolina. Not only has NCWRC participated in biological reviews, stakeholder meetings, and field reviews as part of the CCP process, it is also an active partner in the coordination, planning, and execution of various wildlife and habitat surveys. The NCWRC also assists refuge staff in providing special wildlife observation opportunities. A key part of the comprehensive conservation planning process is the integration of common mission objectives between the Service and the NCWRC, where appropriate.

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

II. Refuge Overview

INTRODUCTION

Mattamuskeet National Wildlife Refuge sits at the southern end of a broad, flat, and swampy peninsula in northeastern North Carolina. One of several national wildlife refuges in the area (Figures 1 and 2), it protects and manages 50,180 acres of wildlife habitat in Hyde County. The Service named the refuge after North Carolina's largest natural lake, the 40,000-acre Lake Mattamuskeet, which comprises almost 80 percent of the refuge's area. The lake averages only two feet in depth, but is 18 miles long and five to six miles wide. In addition to the lake, the refuge's other main habitats are wet pine flatwoods, moist soil units, natural lake shoreline, and cypress-gum swamp. The refuge is surrounded by cropland, marsh, and timber. The village of Fairfield (2000 population: 1,215) lies at the northern edge of the refuge and the village of Engelhard (2000 population: 1,561) lies three miles southeast of the eastern edge of the refuge. The village of Swan Quarter, the county seat (2000 population: 958), lies four miles southwest of the refuge's western edge. Pamlico Sound, which separates the mainland of North Carolina from the Outer Banks to the east, lies seven miles south of the refuge.

REFUGE HISTORY AND PURPOSE

HISTORY

Settlers cleared and drained the area around Lake Mattamuskeet for agriculture early in the nineteenth century. The organic soil was productive cropland. A canal drained the lake to half its original size in 1830. New Holland Farms drained the shallow Lake Mattamuskeet beginning in 1914, with the construction of 130 miles of canals and the world's largest pumping plant at the time. The bottom of the lake provided productive cropland, but maintaining the drained condition was impractical and too expensive and the company abandoned the operation in 1932.

The U.S. Government acquired the land in 1934 under the authority of the National Industrial Recovery Act (48 Statute 195). Mattamuskeet National Wildlife Refuge was established that same year under Executive Order No. 6924. Table 1 shows the refuge's land acquisition history. The Civilian Conservation Corps converted the pumping plant into a hunting lodge (Mattamuskeet Lodge) with ten rooms that operated from 1937 until 1974. The Fish and Wildlife Service constructed impoundments to provide feeding and resting habitat for migrating and wintering wildlife.

Following the refuge's establishment, the numbers of puddle ducks and geese drawn to Lake Mattamuskeet appeared endless and peaked in 1960 when more than 100,000 Canada geese and 200,000 ducks wintered there. A drastic decline in their numbers began soon after and continued until the mid-1980s.

In the mid-1960s, the refuge initiated a long-term habitat enhancement project to optimize wintering waterfowl habitat. The project's focus was on refuge areas historically used by Canada geese and puddle ducks. Between 1967 and 1981, over 2,500 acres of low quality marsh were impounded and restored to conditions that favored the production of waterfowl foods, in what are called moist soil units. Currently, manipulation of water levels and mechanical vegetation control in the moist soil units produce impressive stands of natural waterfowl foods, such as wild millet, panic grasses and spikerushes. In addition, dense beds of submerged vegetation desired by swans, diving ducks, and some puddle ducks, are produced naturally in Lake Mattamuskeet.

Figure 1. Mattamuskeet NWR and other nearby national wildlife refuges.

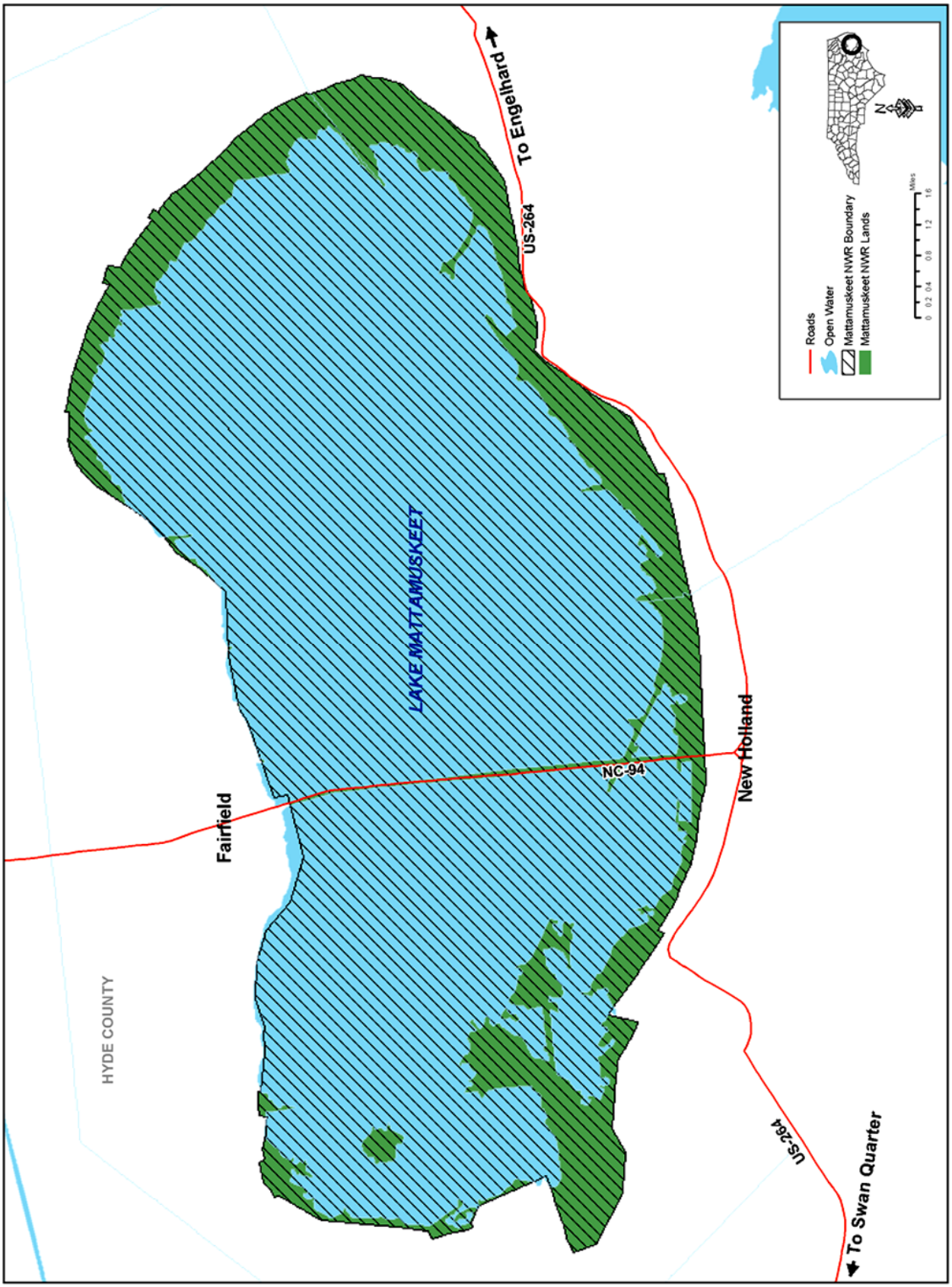


Figure 2. Refuge vicinity map.

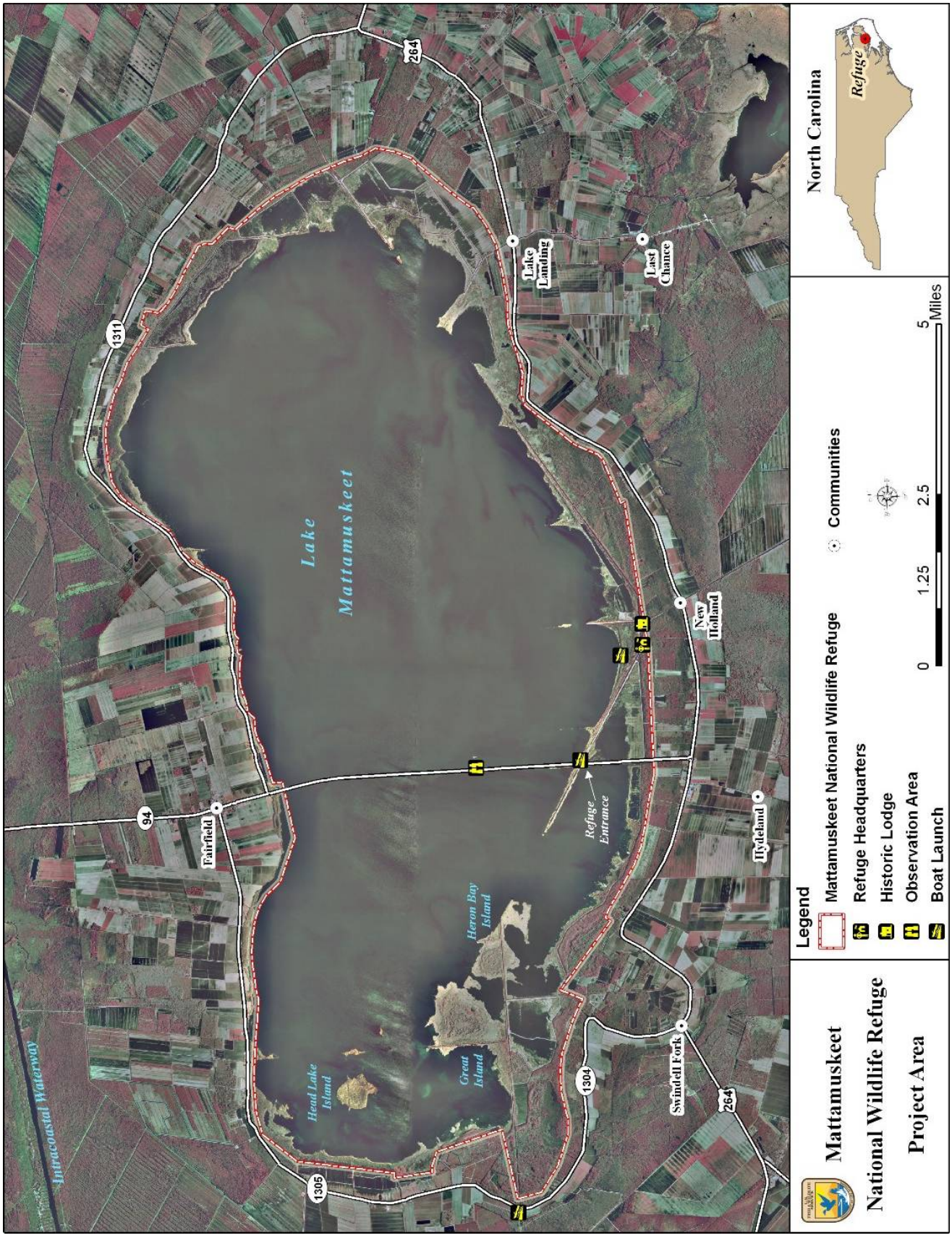


Table 1. Acquisition history of Mattamuskeet NWR.

DATE	TRACTS	ACRES	COST	COST / ACRE	TOTAL ACREAGE	TOTAL COST
1934	1	49,514.71	$311,942.67	$6.30	49,514.71	$311,942.67
1935	1	410.34	$2,585.14	$6.30	49,925.05	$314,527.81
1939	4	219.02	$4,072.70	$18.60	50,144.07	$318,600.51
1943	3*	8.57	$3.00	$0.35	50,152.64	$318,603.51
1944	4*	7.69	$3.00	$0.39	50,160.33	$318,606.51
1945	1*	16.1	$1.00	$0.06	50,176.43	$318,607.51
1946	1*	0.66	$1.00	$1.52	50,177.09	$318,608.51
1973	1#	1.0	-0-	-0-	50,178.09	$318,608.51
1976	1#	0.37	-0-	-0-	50,178.46	$318,608.51
1980	1#	1.72	-0-	-0-	50,180.18	$318,608.51

**Easement*
#Lease

Mattamuskeet Lodge was placed on the National Register of historic Places in 1980. Nevertheless, the lodge fell into poor condition and the Friends of Mattamuskeet Lodge formed in 1990 to restore it. In 1993, the Partnership for the Sounds joined the restoration efforts with the goal of using the lodge for wildlife education and research. In 1996, East Carolina University established the Field Station for Coastal Studies at Mattamuskeet in the lodge. The university restored six rooms with sixteen beds and a laboratory. Despite restoration efforts, severe structural problems were discovered in 1999, and the lodge was closed in 2000. A bill (H.R. 5094) passed by Congress and signed into law in 2006, authorized the transfer of the Mattamuskeet Lodge to the State of North Carolina.

PURPOSE

The purpose of Mattamuskeet National Wildlife Refuge is to protect and conserve migratory birds and other wildlife resources through the protection of wetlands, in accordance with the following:

> *... as a refuge and breeding ground for birds and wild animals, and (2) that such portion as the Secretary of Agriculture [Interior] may deem proper be reserved for use as a shooting area, to be operated under a cooperative agreement or lease .... With regard to the waters ... the Secretary of Agriculture [Interior] ... may enter into a cooperative agreement or lease ... said waters may be used for fishing purposes ...* (Executive Order 6924, dated Dec. 18, 1934)

> *... 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)

... for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. §742f(a)(4) ... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ... 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956)

SPECIAL DESIGNATIONS

In 1979, the North Carolina Natural Heritage Program designated most of the refuge, with the exception of cropland, moist soil areas, and the shop area, as a Significant Natural Heritage Area. The Nature Conservancy ranks certain vegetative communities as imperiled or rare (Table 2).

Table 2. The Nature Conservancy ranking of vegetative communities of Mattamuskeet NWR.

Vegetative Community	State Rank	Global Rank
Cypress – Gum Swamp	S3	G4
Mesic Pine Flatwoods	S3	G5
S3 = Rare or uncommon in North Carolina		
G4 = Apparently secure globally		
G5 = Demonstrably secure globally		

The National Park Service designated a 153-acre area known as Sayler's Ridge as a National Natural Landmark in 1983. The stand of wet pine flatwoods forest in the southwest corner of the refuge is a mature loblolly pine that has not been manipulated since the Service established the refuge in 1934. The stand is unique in that it has not been harvested for timber and is mature enough to be undergoing natural succession from loblolly pine to sweetgum and red maple.

The North Carolina Division of Water Quality has designated several water bodies in the vicinity of Mattamuskeet NWR as outstanding resource waters or high quality waters.

ECOSYSTEM CONTEXT

Mattamuskeet NWR lies within a physiographic area known as the South Atlantic Coastal Plain. 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.

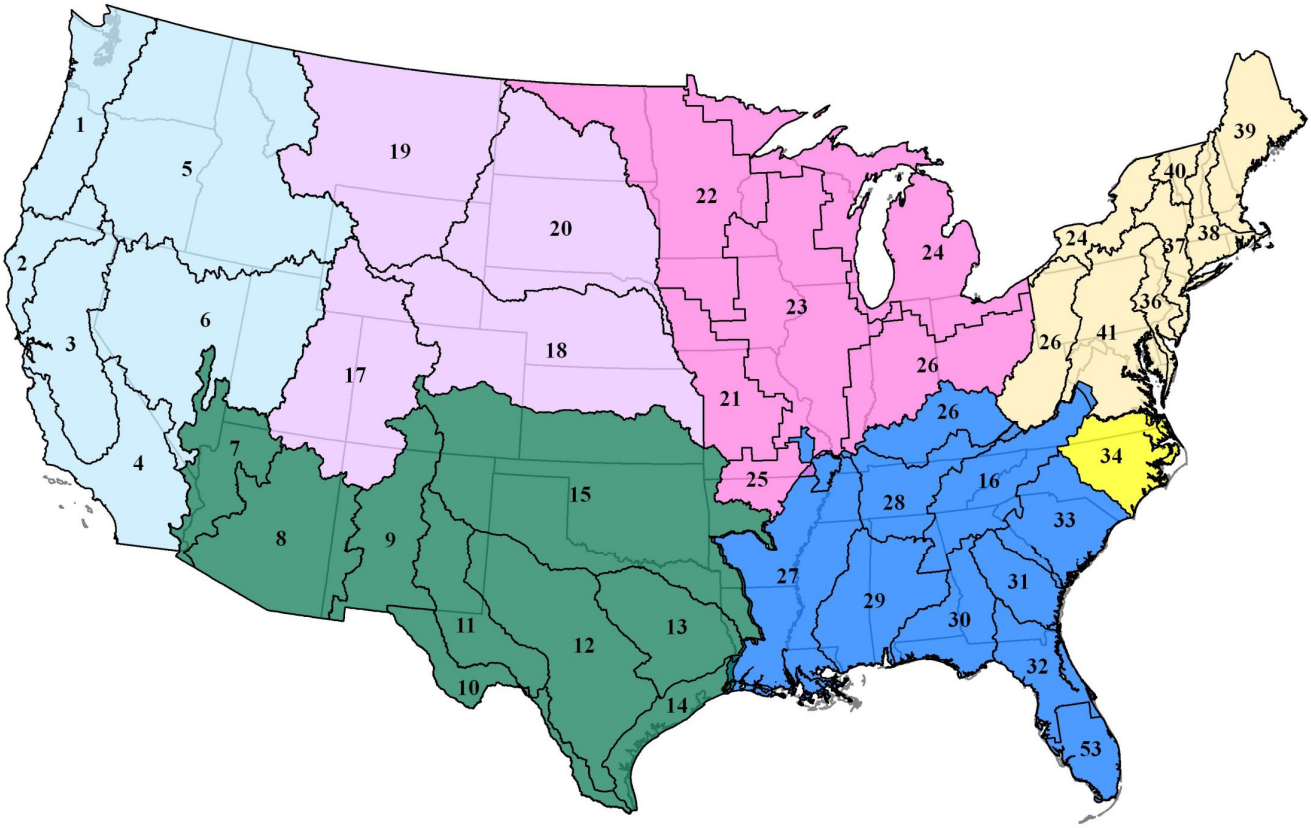
The refuge is one of the ten national wildlife refuges in eastern North Carolina. Those ten refuges, Alligator River, Pea Island, Cedar Island, Currituck, Great Dismal Swamp, Mackay Island, Mattamuskeet, Roanoke River, Pocosin Lakes, Swanquarter, and the Back Bay NWR in Virginia, are all located in the watersheds of the Roanoke, Tar, Neuse, and Cape Fear rivers. For resource management purposes, the Service has designated these watersheds as Ecosystem Unit # 34, the Roanoke–Tar–Neuse–Cape Fear Ecosystem (Figure 3).

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; nongovernmental 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 CCP reflect the North American

Figure 3. Unit 34: The Roanoke–Tar–Neuse–Cape Fear Ecosystem.



Waterfowl Management Plan, which includes the Atlantic Coast Joint Venture between NCWRC and the Service; the Partners in Flight Plan; and the South Atlantic Migratory Bird Initiative (SAMBI).

The Atlantic Coast Joint Venture focuses on the middle and upper Atlantic Coast. Within the Atlantic Coast Joint Venture is the joint venture formed between 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 North Carolina Wildlife Resources Commission, and conservation organizations such as 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.

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

In 2001, Congress, recognizing the need for funding and planning to support the conservation, protection, and restoration of the full gamut of wildlife species, especially those not covered by traditional funding sources, including more than 1,000 federally threatened or endangered species, began providing annual funding allocations to supplement existing state fish and wildlife conservation programs. The new funding required each state and territory to develop a wildlife action plan. The North Carolina Wildlife Action Plan was submitted in 2005 to meet this obligation. The action plan provides a conservation blueprint for agencies, organizations, industries, and academics across the state to advance the sound management of the state's fish and wildlife resources into the future. It identifies critical fish and wildlife resources and priority conservation needs and promotes proactive conservation measures to ensure cost-effective solutions (keeping common species common) instead of reactive measures enacted in the face of imminent losses (NCWRC 2005).

The action plan has five goals: (1) to improve understanding of the species diversity in North Carolina and enhance the state's ability to make conservation or management decisions for all species; (2) to conserve and enhance habitats and the communities they support; (3) to foster partnerships and cooperative efforts among natural resource agencies, organizations, academia and private industry; (4) to support educational efforts to improve understanding of wildlife resources among the general public and conservation stakeholders; and (5) to support and improve existing regulations and programs aimed at conserving habitats and communities (NCWRC 2005).

Mattamuskeet NWR lies entirely within North Carolina's coastal zone, as designated by the Coastal Zone Management Act (CZMA) of 1972. The CZMA requires federal agencies proposing activities within a state's coastal zone to provide the relevant state authority (in this case, the North Carolina Division of Coastal Management (DCM) within the Department of Environment and Natural Resources) with a consistency determination prior to implementing the activity. This consistency determination is intended to document that the proposed activity, such as Mattamuskeet NWR's proposed CCP, complies with the enforceable policies of North Carolina's approved coastal management program and would be conducted consistent with this program. Appendix D contains a draft determination, but the refuge will also continue to prepare and submit individual consistency determinations for specific projects as they arise on a case-by-case basis.

Although the main focus of DCM is regulating coastal development, land use planning and beach access according to North Carolina's Coastal Area Management Act (CAMA), DCM also includes a Coastal Reserve Program devoted to the protection of significant natural areas within the 20 CAMA counties. The Coastal Reserve presently encompasses nine components or sites with a total land/water area in excess of 30,000 acres. Each site is managed expressly for research, education, and compatible recreational uses. A Coastal Reserve Program representative participated in this CCP's goals, objectives, and alternatives workshop.

ECOLOGICAL THREATS AND PROBLEMS

HABITAT LOSS AND FRAGMENTATION

Habitat loss and degradation due to development associated with human population growth are among the greatest threats to wildlife, fish, and overall biodiversity in North Carolina. According to the U.S. Census Bureau, the state's population grew by 15 percent from 1990 to 1999, and growth has continued unabated in the new century. The National Resources Inventory conducted by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) found that North Carolina ranked fourth in the country for total acres of land developed between 1982 and 1997, and second in the country for the percentage increase in developed land (NRCS 2000). As the population grows and land is developed to provide homes, schools, roads, workplaces, and shopping centers for the new residents, fish and wildlife habitats have been modified, fragmented, degraded, and destroyed (NCWRC 2005).

Direct habitat destruction is widely acknowledged as the greatest threat to biodiversity at the species and ecosystem levels (Noss and Peters 1995). Throughout the southeast, less than three percent of pre-Euro-American settlement upland longleaf pine communities (Frost 1993) and only one percent of pre-settlement canebreak and Atlantic white cedar communities remain (Frost 1987). An estimated half of North Carolina's original wetlands have been lost due to development and conversion to cropland (Mitsch and Gosselink 1993). Widespread wildland fire suppression over the past century has contributed significantly to the alteration, changed structure (greater density), and succession of ecologically fire-dependent systems, such as longleaf pine forest and other early successional habitats. Land fragmentation due to highway development, land-use conversion (e.g., from forests to plantations, farms, golf courses, ball fields, and subdivisions), and alterations of landforms, such as beach renourishment and spoil deposition banks, are also significant threats (The Nature Conservancy [TNC] 2000; TNC and NatureServe 2001). The U.S. Department of Agriculture's (USDA) Forest Service estimates that forest acreage in North Carolina has fallen by one million acres (5.6 percent) since 1990, primarily due to development (Brown 2004).

Primarily as a result of the loss and degradation of habitat, there are more than 40 federally listed threatened and endangered animal species and 60 state-listed threatened or endangered animal species in North Carolina. In addition, there are 115 state species of special concern, and many more at risk of being added to that list. North Carolina contains eight of the top 21 most endangered ecosystems in the country, based on extent of decline, present area (rarity), imminence of threat, and number of federally listed threatened and endangered species associated with each type (Noss and Peters 1995):

- Southern Appalachian spruce-fir forest
- Longleaf pine and savanna
- Eastern grasslands, savanna, and barrens
- Coastal communities in the lower 48 states
- Large streams and rivers in the lower 48 states
- Cave and karst systems
- Ancient eastern deciduous forest
- Southern forested wetlands

Beyond the borders of North Carolina, the South Atlantic Coastal Plain in general has changed markedly over the last two centuries 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 urban development and agriculture (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 the 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 have become extinct, threatened, or endangered, include the piping plover, sea turtle, red wolf, Bachman's sparrow, Carolina parakeet and passenger pigeon. The black rail and Rafinesque's big-eared bat are federal species of concern. Table 3 provides a complete list of threatened and endangered animals in North Carolina.

Table 3. Threatened and endangered animal species of the Coastal Plain of North Carolina.

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	Stork, Wood	*Mycteria americana*
Endangered	Sturgeon, Shortnose	*Acipenser brevirostrum*
Endangered	Tern, Roseate**	*Sterna dougallii*
Endangered	Whale, Finback	*Balaenoptera physalus*
Endangered	Whale, Humpback	*Megaptera novaeangliae*
Endangered	Whale, Right	*Balaena glacialis*
Endangered	Whale, Sea	*Balaenoptera borealis*
Endangered	Whale, Sperm	*Physeter catodon*
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*
Threatened	Silverside, Waccamaw	*Menidia extensa*

** Presence Documented on Mattamuskeet National Wildlife Refuge*

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

**** Listed by Similarity of Appearance*

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

More than 300 species of breeding migratory songbirds occupy 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 dwindling 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 reestablishing travel corridors are 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 virtually irreversible. Conversion of pocosins and nonriverine hardwood forests to agriculture results in the oxidation of the organic soils on which those plant communities evolved.

ALTERATIONS TO HYDROLOGY

Destruction and degradation of habitat are widely regarded as the greatest threats to aquatic species in the United States. Physical modifications, such as channelization and dredging, aquifer depletion, impoundment and dam construction, and flow modification, have contributed directly to the decline of aquatic species in the south (Walsh et al. 1995; Etnier 1997). Increases in the area of impervious surfaces within rapidly urbanizing watersheds, and subsequently increased peak stormwater flows, have caused changes in streambank erosion, sediment transport and stream energy, which in turn have led to limitations in the amount of suitable aquatic habitat and stream bed material. The Nature Conservancy identifies altered surface hydrology (e.g., flood control and hydroelectric dams, interbasin transfers of water, drainage ditches, breached levees, artificial levees, dredged inlets and river channels) and a receding water table as among the most significant sources of biological and ecological stress, especially in the Coastal Plain (TNC 2000; TNC and NatureServe 2001; NCWRC 2005).

In addition to the loss of vast acreages of wetlands, substantial alterations have occurred in the hydrology of the South Atlantic Coastal Plain. The changes are a result of channel dredging for navigation and access to marshes; drainage ditches; degradation of aquatic systems from excessive sedimentation and contaminants; urban development; managed stream flows from flood control and hydroelectric power generation reservoirs; river channel modifications; flood control levees; and deforestation.

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).

Instead of natural hydrology, large-scale man-made hydrological alterations have changed the spatial and temporal patterns of flooding throughout the entire South Atlantic Coastal Plain. In addition, these alterations have modified both the extent and duration of annual seasonal flooding, as well as daily flooding. The alteration of the annual flooding regime has had a tremendous effect on the interior forested wetlands and their associated wetland-dependent species. Changes in daily flooding regimes by drainage ditches and closing inlets through coastal barrier islands accelerates erosion on ditch banks and throughout marshes and decreases the exposure of intertidal areas that would be available with normal lunar tidal cycles. According to Mitsch and Gosselink (1993), restoration of wetland functions is especially difficult since wetlands depend on a dynamic interface of hydrologic regimes to maintain water, vegetation, and animal complexes and processes.

The dredging of navigation channels also generates a spoil material that must be disposed of in a compatible manner. The material is not always compatible for placement on the closest potential site, such as beaches where the material must be a suitable substrate for invertebrate populations and shorebird and turtle nesting.

Hydrologic alterations have basically eliminated the geomorphologic processes that created sandbars, oxbow lakes, sloughs, and river meander scars. Consequently, the protection, conservation, and restoration of the aquatic resources are of added importance in light of the alterations associated with navigation and flood control.

SILTATION OF AQUATIC ECOSYSTEMS AND WATER QUALITY IMPACTS

Related to the problem of hydrological alterations above is another threat: siltation or sedimentation of aquatic ecosystems. Deforestation and hydrologic alteration have degraded aquatic systems, including lakes, rivers, sloughs, and bayous. 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. Concurrently, the nonpoint source runoff of excess nutrients and contaminants is threatening the area's remaining aquatic resources. The Service lists six species of aquatic organisms as threatened and 12 species as endangered in North Carolina (Table 4).

Point and nonpoint sources of pollutants compound threats to aquatic systems. Point source pollution is delivered primarily in the form of municipal wastewater, industrial effluent, and industrial stormwater discharges. Most water quality problems in North Carolina, however, arise from nonpoint source pollution associated with land use activities such as development projects, forestry and agricultural practices, and road construction (NCDWQ 2000; SAMAB 1996).

INVASIVE SPECIES INTRODUCTION AND PROLIFERATION

Nonnative and invasive species introductions of both plants and animals threaten native wildlife in North Carolina, as elsewhere. Introductions have occurred in a number of different ways, ranging from intended stockings, to range expansions, to the pet trade, to accidental releases. Impacts on native species are equally varied; some nonnatives out compete native species (e.g., kudzu and Japanese stiltgrass), while others cause hybridization (e.g., red-eared sliders breeding with native

yellow-eared sliders). Still others cause direct mortality to native resources (e.g., red imported fire ants, hemlock wooly adelgid).

Compounding the problems faced by aquatic systems (discussed in the previous two sections) 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 (nonnative) vegetation capable of aggressive growth is further threatening the viability of aquatic systems. These invasive aquatic species threaten the natural aquatic vegetation important to aquatic systems, and choke waterways to a degree that often interferes with or precludes recreational use. Common reed (*Phragmites australis*) is the most dominant of these plants on the Outer Banks and the refuge and has a negative impact on the marshes in the area. In recent years, feral swine have become established in a number of places on the Albermarle-Pamlico Peninsula and will quite likely become established throughout the entire peninsula. This will have severe negative impacts to virtually all habitats and wildlife.

PHYSICAL RESOURCES

The habitat at Mattamuskeet NWR results largely from wetland community development following the Wisconsin Ice Age about 15,000 years ago. Lower sea level during this time period resulted in large, fast-flowing river systems cutting through the coastal plain terrace. As ice caps began melting, sea level rose and it is believed that river flows slowed, depositing organic and silt sediments in the areas between streams. As shallow water areas developed, aquatic vegetation invaded thereby increasing organic deposition. With a warming trend at the end of the ice age, boreal forests began to be gradually replaced with swamps, bogs, marsh, and pocosin habitats. Logging and land clearing activities over the last 300 years have greatly altered all habitat types.

CLIMATE

The climate of Mattamuskeet NWR is characterized by hot, humid summers with temperatures occasionally climbing above 95 degrees Fahrenheit, and moderate winters with temperatures seldom going below 20 degrees Fahrenheit. The annual average precipitation is 52 inches, with a period of heavy rainfall from July through September. Every few years, a hurricane or tropical storm crosses the county, bringing 1 to 3 days of intensive rainfall. Snowfall is rare and seldom exceeds two inches; average annual snowfall is 0.7 inch. On rare occasions, portions of the lake freeze, but never for a long period. Marsh areas frequently freeze in January and February.

Because 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.

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 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, but snowfall is uncommon.

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 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

Mattamuskeet NWR is the product of wetland community development following the Wisconsin Ice Age 15,000 years ago, the last of the Ice Ages during the Pleistocene Epoch. 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. As this occurred, river flows were slowed and organic sediment loads were deposited in the inter-stream areas as flowing systems shifted to slow-moving streams. Aquatic plants began to grow in these shallow bodies of water, adding to the accumulation of sediment and aquatic debris. Simultaneously, a climatic warming trend accompanied the end of the Ice Age. This warming trend helped to eliminate the cooler climate boreal forests and replace them with swamps, bogs, marshes, and pocosin habitats.

The refuge lies on the Pamlico Terrace, an extensive low flat plain lying east of the Suffolk Scarp, a prehistoric Atlantic Ocean shoreline. The terrace slopes from 10–16 foot elevations (above mean sea level) at the base of the scarp gently eastward to 1–2 feet elevation 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 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 three 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.

MINERALS

Sand is the only mineral resource occurring locally in economic quantities. There are no sand pits in the vicinity of the refuge.

SOILS

Soil types identified on the refuge are: Belhaven muck*, Ponzer muck*, Conaby muck*, Engelhard very fine sand*, Weeksville loam*, New Holland mucky loamy sand*, Udorthents, Fortescue silt loam*, Hydeland silt loam*, Portsmouth mucky sandy loam*, Wysocking very fine sandy loam*, and Acredale silt loam* (USDA Soil Conservation Service 2001) (Table 4). The soils with an asterisk are

listed as hydric in *Hydric Soils of the United States* (USDA Soil Conservation Service 1985). Hydric soils are those "… that in their undrained condition are saturated, flooded or ponded long enough

Table 4. Soil characteristics at Mattamuskeet NWR.

Series	Approximate Acreage	Surface Texture	Muck Depth	Water Table Depth	Flooding Frequency
Belhaven*	1,130	Muck	40”	0-1’	Rare
Ponzer*	30	Muck	21”	0-1’	Rare
Conaby*	80	Muck	13”	0-1’	Rare
Engelhard*	3,125	Very Fine Sand	None	0-1’	Rare
Weeksville*	1,430	Loam	None	0-1’	Rare
New Holland*	1,245	Mucky Loamy Sand	None	0-1’	Rare
Udorthents*	645	Sand	None	0-6’	Rare
Fortescue*	290	Silt Loam	None	0-1’	Rare
Hydeland*	210	Silt Loam	None	0-1’	Rare
Portsmouth*	195	Mucky Sandy Loam	None	0-1’	Rare
Wysocking*	40	Very Fine Sandy Loam	None	0-1’	Rare
Acredale*	5	Silt Loam	None	>6’	Rare
Total Land	8,425				
Impoundments	2,755				
Water	40,000				
Total	**51,180**				

**Hydric soil*

during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic (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 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, acidic soils. Tall trees are unable to establish their deep root systems in 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 no soils with more than 51 inches of muck over mineral soil identified on the refuge. The following soils have surface layers of 16 to 51 inches of muck: Belhaven (1,130 acres; 13 percent of the land area of the refuge) and Ponzer (30 acres; 0.3 percent). These soils are excessively wet, but rarely flood. They are 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, 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. Conaby soil (80 acres, 1.0 percent) has less than 16 inches of muck over mineral soil. The native vegetation on these soils is the maple, gum, and baldcypress 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 Conaby as a prime farmland soils.

Mineral soils make up 7,165 acres (85.7 percent) of the land area of the refuge. The soil with the largest area is Engelhard very fine sand (3,124 acres mostly in the northcentral part of the refuge, 36 percent of land area), followed by Weeksville loam (1,427, 16 percent); New Holland (1,245, 15 percent); Udorthents (644, 8 percent); Fortescue (289, 3 percent); Hydeland (212, 2 percent); Portsmouth (199, 2 percent); Wysocking (42, <1 percent); and Acredale (5, <1 percent). 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, baldcypress, swamp blackgum, red maple, sweetgum, water oak, willow oak, and swamp white oak. The USDA Natural Resources Conservation Service classifies Acredale, Engelhard, Fortescue, Hydeland, New Holland, Portsmouth, Weeksville, and Wysocking as prime farmland soils if drained. The refuge's cropland is on Engelhard soils.

The Udorthent soils are well-drained to droughty and are more suitable for native tree species such as longleaf pine, loblolly pine, and upland oak species such as white oak and red oak. Udorthents are the dredge spoils from the canals and ditches and are extremely droughty.

HYDROLOGY

Ground water provides the freshwater resources for the area. Studies have shown that the ground water 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 semiconfined 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 infiltrates the soil and 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 fresh water 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.

WATER QUALITY

There are three National Pollution Discharge Elimination System (NPDES) permitted sites that discharge into waters adjacent to the refuge. Two are seafood-processing plants and one is a domestic water supply treatment plant.
The state has classified North Carolina water bodies and streams according to their water quality and the uses that quality supports. The classifications for the waters surrounding the Mattamuskeet NWR are listed in Table 5.

Table 5. Classifications of water bodies and streams surrounding Mattamuskeet NWR.

Water Body or Stream	Classification	Best Uses
Boundary Canal Rose Canal Swindells Canal Florida Canal Burrus Canal Carters Canal Jarvis Canal	C– Low Quality Freshwater SW – Low Velocity Water	Secondary Recreation (Not Swimming)
Lake Mattamuskeet Rose Bay Canal Outfall Canal Quarter Canal Gray Ditch Waupopin Canal Fairfield Canal	SC– Low Quality Saltwater	Secondary Recreation (Not Swimming)

AIR QUALITY

Under the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has established primary air quality standards to protect public health. The EPA has also set secondary standards to protect public welfare. Secondary standards relate to protecting ecosystems, including plants and animals, from harm, as well as protecting against decreased visibility and damage to crops, vegetation, and buildings.

The EPA has developed National Ambient Air Quality Standards (NAAQS) for six principal air pollutants (also called “criteria pollutants”). They are ground-level ozone (O_3); particulate matter (PM); nitrogen dioxide (NO_2); sulfur dioxide (SO_2); carbon monoxide (CO); and lead (Pb). Areas that meet the NAAQS for the criteria pollutants are to be “in attainment,” while areas that exceed the NAAQS are said to be “nonattainment areas.” The area closest to the refuge that an environmental agency monitors for all of the criteria pollutants is the Virginia Beach-Norfolk, Virginia, metropolitan area. The EPA monitors carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide and particulates in Norfolk, Virginia Beach, Hampton, Newport News, Suffolk, and Chesapeake. Despite the large population with the industry, traffic, and power plants, the area has exceeded only ozone level standards in 2002. Monitoring has indicated unhealthy levels only twice and unhealthy levels for sensitive groups only thirteen times. The better air quality than expected is due to the breezes blowing through the area from the ocean.

Closer to the refuge, data from the state show that Hyde County is in attainment both for ground-level ozone and PM2.5 (particulate matter less than 2.5 microns in diameter) (North Carolina Division of Air Quality 2005). Based on EPA's most current data, Hyde County ranks among the cleanest or best 20 percent of all counties in the country. This is based on an average individual's estimated added cancer risk from hazardous air pollutants (Scorecard 2005). Table 6 presents annual emissions of criteria pollutants for Hyde County.

Table 6. Annual emissions (tons) of select criteria pollutants in Hyde County, North Carolina.

	CO	NOx*	PM-10	SO_2	VOCs*
Mobile Sources	8,836	1,095	303	150	3,325
Areas Sources	9,521	178	1,690	87	1,614
Point Sources	0	14	0	1	0
All Sources	18,358	1,287	1,993	238	4,939
Ranking***	Highest 60-70%	Lowest 20-30%	Lowest 10-20%	Lowest 30-40%	Highest 70-80%

* Nitrogen oxides, including NO_2
** Volatile Organic Compounds, a precursor to ozone
*** Rank of county compared with all counties in USA; a lower ranking is better (fewer pollutants emitted)
Source: Scorecard, 2005

Prescribed burning on the refuge has the potential to have a short-term adverse impact on air quality. The State of North Carolina specifies that prescribed fires purposely set in 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.

VISUAL RESOURCES

Mattamuskeet NWR offers a great variety of habitats and wildlife species; however, effort on the part of the observer is often required in order to see and appreciate the resources. There is certainly a grand opportunity for visitors to see and experience habitats and wildlife not available in other places. From the shorelines of Lake Mattamuskeet, visitors can watch sunrises, sunsets, forest silhouettes, and other scenic vistas. One of the first and most popular sights seen by refuge visitors is the view from the causeway (North Carolina Route 94) through Lake Mattamuskeet. For many visitors, this is their first exposure to tundra swans.

Trails, roadways, and fishing areas; and opportunities for canoeing and kayaking into dense and unique habitats all make this refuge a popular spot. The causeway through the lake, the entrance road, and the wildlife drive south of the lake offer scenic vistas of wildlife management areas and good, close-up examples of an impoundment managed for waterfowl and shorebirds.

Mattamuskeet Lodge is Hyde County's most famous landmark. It is the county's tallest man-made structure and represents significant events in the county's history from large-scale drainage and land clearing for agriculture to the popularity waterfowl hunting as a recreational pursuit. Area visitors will see images of the lodge throughout the county.

U.S. Highway 264, as it passes just south of Mattamuskeet NWR, and North Carolina Route 94, as it passes through the refuge, are part of the Alligator River Route of the North Carolina Scenic Byway. Motorists in the area frequently hope that they will spot black bear and the far more elusive American alligator, red-cockaded woodpecker and red wolf. The Charles Kuralt Trail also highlights the refuge. This auto trail was established to help people enjoy the wildlands and 11 national wildlife refuges of the mid-Atlantic coastal plain of North Carolina and Virginia, and to commemorate the famous broadcast journalist and native North Carolinian who shared the delights and wonders of off-the-beaten-track spots like these with his fellow Americans (Northeastern North Carolina 2007).

BIOLOGICAL RESOURCES

HABITAT

Human development activities have profoundly affected plant communities on the refuge over time. Some of these activities occurred before the Service established the refuge and some have occurred since. Most notable today are the road/canal systems, public highways, farmland, and the refuge maintenance/support facilities. However, the undisturbed swamp forest and wetlands on the refuge contains many important wildlife and ecological resources. Since clearcutting, peat mining, and agricultural conversion have developed much of the Albemarle-Pamlico peninsula, this area remains as important wildlife habitat in eastern North Carolina. Lake Mattamuskeet is the dominant habitat feature on the refuge. Other principal habitats are moist soil units to support waterfowl, shorebirds, and wading birds; freshwater marshes to support marsh birds and wading birds; and wet pine flatwoods to support mammals and songbirds. Hyde County, in which Mattamuskeet NWR lies, is a stronghold for the black bear in North Carolina and the mid-Atlantic coast. In terms of listed species, the refuge also has the potential for habitat for the endangered red-cockaded woodpecker, currently hosts bald eagles, and was a site for reintroduction of the red wolf. More recently, the staff has utilized prescribed fire to maintain plant communities and a variety of successional stages on the refuge.

Twelve habitat types or land uses are found on the refuge (Figure 4 and Table 7). These cover types, for the most part, are classified as wetlands based upon vegetation, degree of soil saturation, and hydroperiod. All cropland is classified as prior converted wetland.

Open Water
Lake Mattamuskeet is the prominent habitat feature of the refuge (Table 7 and Figure 4). The 40,276-acre lake is a shallow basin ranging from 0.5 to 3 feet deep. The source of water for the lake is rainfall and surface runoff from adjacent agricultural land. Water pH ranges from neutral to slightly acidic. In Lake Mattamuskeet, submerged aquatic vegetation (SAV) is an important habitat component. The most common SAV is wild celery, redhead grass, and musk grass.

It is difficult to exaggerate the true importance of the lake and its surrounding impoundments and wetlands to regional wintering waterfowl. This refuge is indeed a magnet that attracts a majority of the current swans and pintails inventoried along the entire Atlantic Coast. Literally tens of thousands of tundra swans, geese, wading birds, shore birds, and hundreds of thousands ducks utilize this nucleus during fall, winter, and spring migrations.

Table 7. Acreage by habitat or land use under fee title ownership at Mattamuskeet NWR.

Habitat	Acreage
Open Water	40,276
Freshwater Marsh	2,046
Nonriverine Swamp Forest	1,933
Mixed Pine Hardwood Forest	1,210
Wet Pine Flatwoods	960
Moist Soil Unit Impoundment	1,997
Cypress-Gum Impoundment	572
Cypress-Gum Swamp	266
Cropland	191
Conservation Reserve Program (CRP) Field	189
Administrative Areas	401
High Pocosin	139
Total Acres	**50,180**

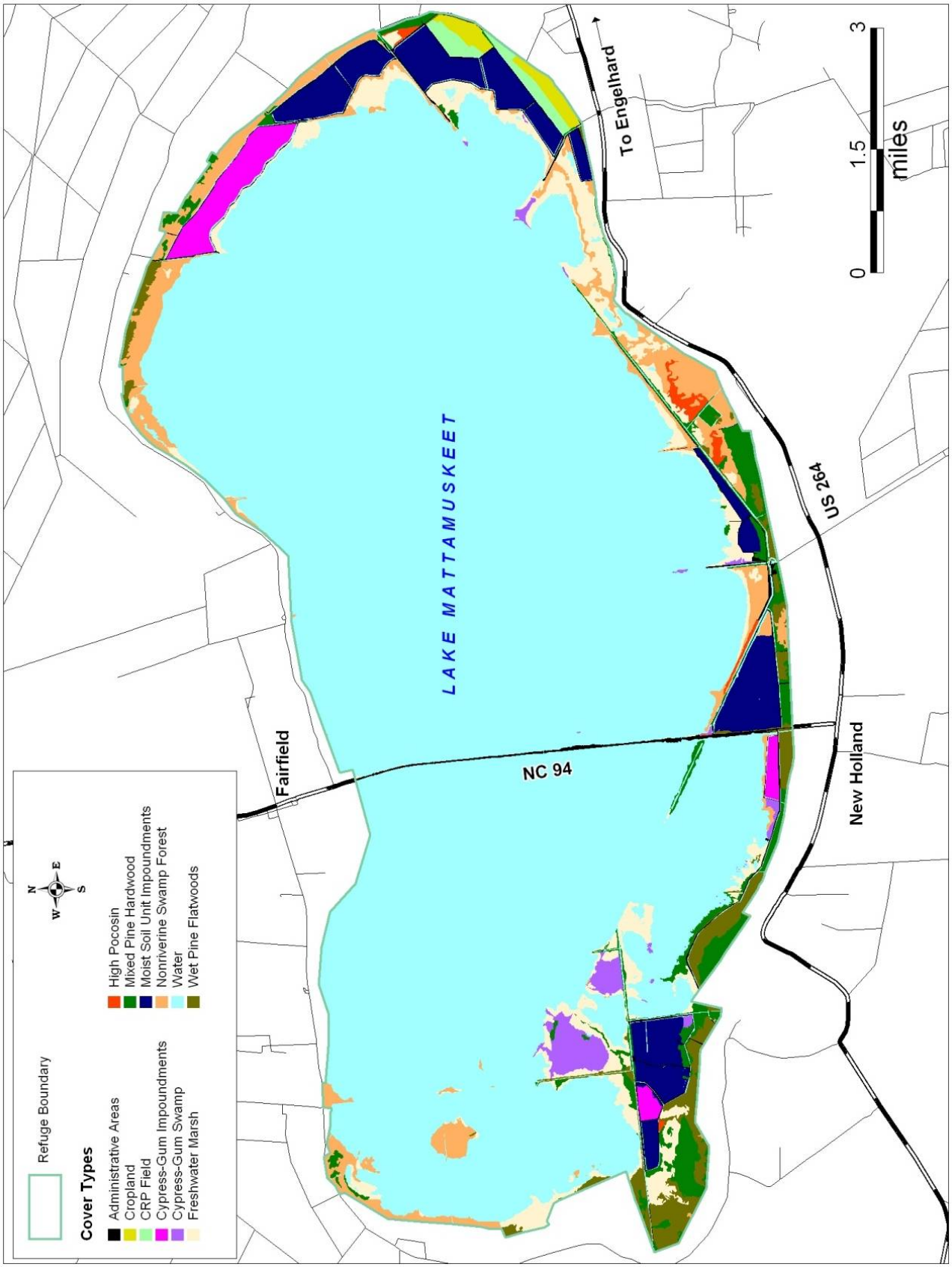
Freshwater Marsh

The majority of the 2,046 acres of marsh lies on the southern edge of Lake Mattamuskeet. Most natural marshes have a natural fire frequency of one to three years, but some areas have endured fire exclusion during the past half century or longer. As a result, the unburned areas have a lack of species diversity, as only one to three species of marsh grasses predominate in the wetter or lower marshes, and encroaching brush has now dominated the high marshes. On Mattamuskeet NWR, sawgrass and cattail historically dominated unburned marshes but these marshes are now dominated by phragmites (*Phragmites australis*). Marshes with natural fire frequencies have a diversity of sedges, rushes, bulrushes, and wildflowers.

Dead grass makes up a large component of marsh stands that have not been burned, limiting plant productivity and nutrient availability and adversely affecting wildlife habitat. Infrequent natural fire or prescribed burning results in invasion by shrubs that occupy 500 acres of marsh. Invasion by common reed has been a major problem in the marshes and it occupies 900 acres. Control of invasive species requires a combination of fire, mowing, flooding, and herbicide applications.

The marshes are essential habitats for rails, bitterns, salt marsh sharp-tailed sparrow, and seaside sparrow. Peregrine falcons and northern harriers hunt in the marshes. Waterfowl such as American black ducks use the marsh for food and cover. Marshes are also vital nursery areas and habitats for many saltwater species as well as species of freshwater fish, crustaceans, and mollusks (Table 7 and Figure 4).

Figure 4. Habitats and land use at Mattamuskeet National Wildlife Refuge.



Nonriverine Swamp Forest
This habitat type occurs on 1,933 acres of shallow organic soils found primarily in the southeastern and northeastern edges of Lake Mattamuskeet (Table 7 and Figure 4). 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 sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), and loblolly pine (*Pinus taeda*) dominate 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 (*I. 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*).

Mixed Pine Hardwood Forest
Forests of mixed hardwoods and pines are found on 1,210 acres in the western half of the southern edge of Lake Mattamuskeet. Red maple, red bay (*Persea borbonia*), and swamp tupelo are dominant hardwood trees with an average height of 50 to 60 feet. Pond pine (*Pinus serotina*) and loblolly pine (*P. 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 (Table 7 and Figure 4).

Wet Pine Flatwoods Forest
Forests of mixtures of loblolly pine and hardwood trees are found on 960 acres in scattered areas throughout the refuge (Table 7 and Figure 4). Red maple, red bay, and black gum trees are dominant hardwood species with an average height of 50 to 60 feet. Loblolly pine is the primary pine species present. Dominant shrubs are waxmyrtle, fetterbush, bitter gallberry, and sweet bay. Little or no herbaceous vegetation is present (Noffsinger et. al 1984). Chinese privet (*Ligustrum chinense*) and Japanese honeysuckle (*Lonicera japonica*) are invasive weeds of concern. Cane may be found in some locations. The refuge staff manages areas with enough pine straw with prescribed fire to control understory vegetation and reduce fuels that could pose a wildfire hazard. The National Park Service has designated a 150-acre old-growth stand as a National Natural Area.

Moist Soil Unit Impoundments
The Service developed approximately 1,933 acres as moist soil management units on the southern edge of Lake Mattamuskeet in the late 1960s and early 1970s.

Water management in the moist soil units is done to promote optimum growth conditions for vegetation adapted to growing in a moist environment that produce good waterfowl food. This generally entails a slow drawdown of water in the spring. However, each unit is drawn down at a different time to create a diversity of habitats. Drawdowns may begin as early as March and end as late as early June. A slow drawdown is generally preferred to avoid flushing nutrients and coliform bacteria from the farm fields. Some units may be completely dried out during the spring and early summer so that treatments such as burning, disking, and planting can be conducted to encourage moist soil plant growth and/or set back noxious weeds and perennial plants. Monitoring determines the quality of the vegetation in each unit and the results of monitoring dictates whether the unit requires more intensive management (Table 8). Once treatments are complete, moist soil conditions are maintained during the remainder of the summer. During years with very dry summers, water may

be pumped into moist soil units to facilitate growth of moist soil plants. In early fall, the units are gradually flooded to encourage use by waterfowl (Table 7 and Figure 4).

Cypress-Gum Impoundments
This vegetation type is encompassed by three forested impoundments totaling 572 acres which are located adjacent to moist soil units and are flooded semipermanently to function as a very wet cypress-gum swamp containing open water, freshwater marsh, and moist soil plants. These wetlands provide important breeding habitat for wood ducks and wintering habitat for greenwing teal and ringneck duck. They also provide habitat for turtles, frogs, water snakes, and many species of wading birds. Once every three to five years the forested impoundments are drawn down to reduce the carp population and to encourage moist soil plant growth.

Table 8. Examples of vegetation in moist soil units with different levels of management.

Intensive Management – Good/Fair Waterfowl Foods	Minimal Management – Poor Waterfowl Foods
Barnyardgrass	Alligatorweed
Dwarf spikerush	Broadleaf cattail
Fall panicum	Centella
Flat Sedge, yellow nut	Cocklebur
Foursquare	Common reed (Phragmites)
Seedbox	Dog Fennel
Smooth beggarticks	Early whitetop fleabane
Southern naiad	Morning Glory
Smartweed	Sesbania
Water hyssop	Woolgrass
Walter's wild millet	

Cypress-Gum Swamp
This cover type is found primarily on 266 acres of islands located in the southwest portion of Lake Mattamuskeet. Dominant tree species are bald cypress, black gum, red maple, and red bay. Other tree species may include Carolina water ash and green ash. An occasional loblolly or pond pine may be found scattered throughout. Average canopy height of these trees varies depending upon hydroperiod and past logging practices but can be 100 to 120 feet. Large trees suitable for denning by many wildlife species may be found throughout this forest type. These den trees add a very important component to the overall habitat. The den trees house species such as neotropical migratory songbirds, wood ducks, bats, raccoons, and black bear. Red bay, greenbrier, titi, and fetterbush make up the shrub layer. Very little if any herbaceous vegetation is present in the understory (Table 7 and Figure 4).

Cropland
The 191 acres of cropland (excluding 189 acres under the Conservation Reserve Program) provide a high energy food (corn) close to moist soil sites with minimal daily disturbance to help meet the needs of ducks and geese. In North Carolina, the availability of high energy foods is severely reduced during critical periods (December, January, and February) due to the practice of harvesting such crops in September or earlier. This lack of high energy foods (hot foods) is a potential limiting factor for geese, swans, and ducks in North Carolina during critical weather events. Private lands play an important role in supplying habitat needs of migratory birds, but cropland on the refuge provides a more reliable and long-term habitat and sanctuary need.

The cropland is rented out to local farmers (cooperative farmers) who farm the land and leave a portion of the crop standing in the field as a rental payment. The rent payment in crops provides approximately 95 acres of high energy food (corn), which is thus available for waterfowl. The farmers operate under a Cooperative Farming Agreement that specifies the use of a crop rotation which is approved by the USDA Natural Resources Conservation Service, focusing on corn, soybeans, and wheat (Table 7 and Figure 4).

Conservation Reserve Program (CRP) Fields
A total of 189 acres of cropland which was prone to wetness and yielded poorly was taken out of production in 2001 and allowed to grow into a natural stand of grasses and forbs. Broomsedge bluestem, tall fescue, goldenrod, asters and other herbaceous species predominate. Some sections also have wax myrtle and bacharus shrubs. White-tailed deer, gray fox, marsh rabbits, cotton rats, red-winged blackbirds and northern harrier are some of the more common species which use the area. Occasionally, red wolves hunt in the area for food. Periodic fire and/or mowing are used to maintain the area as a grasslalnd and prevent it from growing into forest. The area provides a unique habitat on the refuge as most of the refuge is forested or wetland.

Administrative Areas
The refuge requires dikes, roads, parking lots, office and maintenance/storage buildings, residences, and lawns to provide safe and efficient access to the refuge, facilitate visitation, house employees, and store vehicles and equipment used in management. The staff does not manage these areas intensively for wildlife. Roadsides and lawns do fragment natural habitat and create corridors along which exotic and invasive plants thrive and spread. However, they also provide habitat for robins, nesting turtles, rabbits, and kestrels.

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 (10–15 feet) than those in low pocosins and trees, mostly pond pine (*Pinus serotina*), may grow up to thirty to forty 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 almost 140 acres, mostly on deep organic soils on the eastern half of the southern edge of Lake Mattamuskeet (Table 7 and Figure 4).

INVASIVE AND NONNATIVE PLANTS (EXOTICS)

Alligatorweed (*Alternanthera philoxeroides)* is an invasive plant currently found in the refuge's canals and impoundments. Common reed (*Phragmities australis)* is found throughout various refuge areas including lakeshores, marshes, moist soil units, and disturbed sites. Recent intensive control efforts have significantly reduced the presence of this species in moist soil impoundments but extensive stands remain along the shoreline of the lake.

The Service planted roadsides to tall fescue and lawns to Kentucky bluegrass, Bermuda grass and white clover as there are no native grasses or legume species that tolerate frequent mowing at low heights. Low mowing heights minimize seed production and the potential for the exotic species to escape into natural habitats. The corridors along roads and levees do facilitate the spread of other exotic species such as thistle (*Cirsium sp*.), mimosa (*Albizia julibrissin*), white poplar (*Populus alba*),

Chinese privet (*Ligustrum chinense*), and Japanese honeysuckle (*Lonicera japonica*) which thrive and spread on roadside environments and the edges of natural habitats.

THREATENED AND ENDANGERED PLANTS

Although no comprehensive botanical surveys have been conducted, there are no known federally listed plants on the refuge. However, Sensitive Joint Vetch, *Aeschynomene virginica*, a federally threatened species, does occur near the refuge and may possibly occur on the refuge.

WILDLIFE

Mattamuskeet NWR lies in the middle of the Atlantic Flyway and provides a valuable wintering area for the waterfowl using this migration route, which extends from Canada southward. Thousands of Canada geese, snow geese, tundra swan and 22 species of ducks overwinter on the refuge annually.

Although celebrated primarily for its waterfowl, Mattamuskeet NWR also provides habitat for formerly listed species such as the bald eagle and peregrine falcon. Deer, bobcats, otters, black bear, 240 species of birds and other wildlife species are indigenous to the area. The refuge 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

Mattamuskeet 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 as the Wayne's black-throated green warbler, a distinct form of prairie warbler, and an unusually dense population of worm-eating warblers (Watts and Paxton 2002). There are approximately 250 species of birds that visit regularly with about 40–50 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 25 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 birds are migratory.

Waterfowl. Lake Mattamuskeet provides 40,000 acres of open water for resting, feeding, and escape cover. The moist soil management units support large numbers of waterfowl. The wood duck is the most abundant year-round species. This species is most often associated with lakeshores, wooded swamps, ditches, and canals. The most prevalent wintering species are found in moist soil units and refuge marshes and include northern pintail, green-winged teal, gadwall, widgeon, mallard, and black duck (Table 9). Other species wintering or migrating on the refuge and surrounding waters may include blue-winged teal, ring-necked duck, shoveler, scaup, canvasback, ruddy duck, red head, bufflehead, hooded merganser and red-breasted merganser. Tundra swan numbers increased steadily to a peak of about 25,000 birds on average. There is a flock of resident Canada geese on the refuge. Both migratory Canada geese and snow geese use the refuge. The refuge is an important wintering area for the Atlantic Population of Canada (AP) Geese. Although this population

has increased significantly in the Atlantic Flyway over the last decade, the numbers of AP geese wintering in northeastern North Carolina have not returned to historic levels.

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.

Table 9. Waterfowl survey results, 2006–2007.

Species	12/19/06	1/10/07
Northern Pintail	27,060	45,773
American Green-Winged Teal	55,247	96,627
Blue-Winged Teal	12	8
Tundra Swan	27,839	28,000
Lesser Snow Goose	2,500	11,700
Canada Goose	5,889	4,236
American Wigeon	16,246	7,675
Mallard	1,548	1,583
Ring-necked Duck	27,698	30,425
Ruddy Duck	345	233
Northern Shoveler	169	719
Black Duck	3,465	3,764
Gadwall	732	1,364
American Coot	64,595	26,905
Redhead	110	7,920
Canvasback	55	247
Lesser Scaup	60	440
Hooded Merganser	7	40
Red Breasted Merganser	42	20
Wood Duck	57	0
Total Waterfowl	233,678	267,679

Wintering Birds. The most common winter species are the American robin, yellow-rumped warbler, red-winged blackbird, sparrows, and northern bobwhite. Robins feed heavily on berries of redbay and greenbrier and roost in large concentrations along canals and ditches. Myrtle warblers use vegetated canal banks and forest edges. They feed heavily on wax myrtle berries. Northern bobwhite and red-winged blackbirds overwinter primarily in the agricultural fields on the refuge. The song sparrow, fox sparrow, swamp sparrow, white-throated sparrow, and savannah sparrow inhabit the agricultural grassland filter strips. Mourning doves and crows winter on the refuge in smaller numbers, making use of the farm fields. The American kestrel and the red-tailed hawk prey in the open areas of the refuge, while the northern harrier hunts over the marshes and fields.

Transient Species. The refuge lies in the path of the Atlantic Flyway, a major migration route running north and south along the Atlantic seaboard of North America. The refuge provides resting and foraging areas for many migrant species which winter farther south. Species that migrate through the refuge during the fall include the blue-winged teal; raptors such as the broad-winged hawk and merlin; shorebirds; and a variety of perching birds (passerines) 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 of these occur on the refuge. Common land mammals include several species of mice and rats, bats, rabbits, opossums, and white-tailed deer. Semiaquatic furbearers such as the muskrat, river otter and nonnative nutria 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 five-year intervals show that the population is at or very near the carrying capacity for pocosin habitat. The black bear population is among the highest in density in the southeast. Numerous sightings of eastern cougar have been reported, but none have been confirmed.

American Black Bear. The Albemarle-Pamlico peninsula has one of the largest concentrations of black bear found in the southeastern United States. Hyde County annually has one of the top two highest levels of bear harvest of all counties in North Carolina. Approximately 10,000 acres of the refuge has forested wetlands which are used by black bears. These forests occur as a narrow strip of land around Lake Mattamuskeet, thus their value and use by black bear is largely determined by land use practices on adjacent private property. Most adjacent private property is farmed and/or used for waterfowl impoundments, thus bear habitat is quite limited on the refuge. The southwest portion of the refuge has the greatest bear population on the refuge; this is also where the largest tracts of forest occur on the refuge as well as on neighboring private property.

White-tailed Deer. The white-tailed deer is one of the most sought-after game species in the region. 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 best estimates for pocosin habitat is about six 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 refuge, 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 Mattamuskeet deer were within an optimal stocking density for the nutritional capacity of the habitat.

The refuge conducts two two-day hunts in October of each year to help keep the deer population healthy. Annual harvest during the past 10 years was between 50 and 80 deer, with approximately 1/3 female and 2/3 male.

Furbearers. Mattamuskeet NWR provides habitat for several fur-bearing species. Raccoon, nutria, muskrat, otter and mink make use of the canals and streams that run through the refuge. The gray fox primarily uses edge habitats, 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

Sixty-one species of reptiles and amphibians are reported for the refuge. Reptiles and amphibians are most numerous and diverse around permanent and semipermanent open water, marshes, creeks, lakes, and canals. 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; the southern leopard frog; and a wide variety of snakes. Four species of venomous snakes have been documented on the refuge: the cottonmouth moccasin, canebrake (timber) rattlesnake, pygmy rattlesnake, and copperhead.

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

Fish

The fishery on and surrounding Mattamuskeet NWR is diverse and productive. The refuge's interior lakes and streams 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 largemouth bass, black crappie, white bass (white perch), a variety of sunfish (bream), and catfish inhabit Lake Mattamuskeet and the associated canals on the refuge. These and other freshwater species provide a large portion of the diet of migratory species, which are important to both sport and commercial fishermen. 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 estuary, inhabit these areas as juveniles, mature offshore in the ocean, and return to these streams to spawn as adults. These species include striped bass, alewife, and blueback herring. The American eel, *Anguilla rostrata*, is the primary catadromous species on the refuge. This species spawns in the Sargasso Sea, travels to the east coast of the United States, and matures in freshwater streams and lakes.

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 the USDA 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 other than on Roanoke Island.

Since the mid-1990s, southern pine beetle outbreaks and cutting controlling buffers have 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.

Fire ants are well established on the refuge and occur in large densities on levees, roadsides, and lawns. They can outcompete native ants in these areas and can easily kill flightless baby birds and other small slow-moving animals.

Invasive and Nonnative Animals (Exotics)
At the present time little is known about the impact of exotic (nonnative) animals to native wildlife on the refuge. Feral cats and dogs can be found on the refuge, but their population size and use of the refuge is little understood.

The nutria was introduced from South America many years ago but has spread throughout the southeast and is now naturalized. It is very abundant on the refuge. Although the nutria can be destructive to levees and vegetation, the species is used as a food source by alligators and other native predators. The impacts of nutria to waterfowl and other waterbirds are not known and are an important research need.

Feral swine are established within a few miles of the northwest corner of the refuge. It is quite likely they will inhabit the refuge within the next few years. They will have a profound effect on virtually all habitats on the refuge and will quite likely reduce the population levels of many species including waterfowl. Nearly 50 percent of all waterfowl on the refuge occur in the managed impoundments; thus any destruction of moist soil plants by feral swine will have a direct negative impact on waterfowl.

Coyotes are not native to North Carolina but are nevertheless becoming much more common throughout the state. Other canines including the native gray fox and the reintroduced red wolf are negatively influenced by coyotes. A continued increase in the coyote population will likely affect many other species as well.

Threatened and Endangered Wildlife Species
Several federally listed species occur, or may occur, in the area. Among them are the red-cockaded woodpecker, red wolf, and American alligator. The red wolf occurs throughout the refuge.

The red-cockaded woodpecker has not been documented to occur on the refuge in recent times. However, there are active colonies on the nearby Gull Rock Gamelands Area. No recent surveys have been conducted but suitable habitat may be present in the southwestern portion of the refuge.

The Service first reintroduced the red wolf on the refuge 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 one to two packs of wolves on the refuge at any given 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 with the American crocodile in North Carolina and is found in aquatic habitat throughout the refuge. The Service has documented nesting in recent years on the refuge, but the current population is not known.

CULTURAL RESOURCES

Cultural resources include historic properties as defined in the National Historic Preservation Act (NHPA), cultural items as defined in the Native American Graves Protection and Repatriation Act (NAGPRA), archaeological resources as defined in the Archeological Resources Protection Act (ARPA), sacred sites as defined in Executive Order 13007, *Protection and Accommodation of Access To "Indian Sacred Sites"* to which access is provided under the American Indian Religious Freedom Act (AIRFA), and collections. As defined by the NHPA, a historic property or historic resource is any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP), including any artifacts, records, and remains that are related to and located in such properties. The term also includes properties of traditional religious and cultural importance (traditional cultural properties), which are eligible for inclusion in the NRHP as a result of their association with the cultural practices or beliefs of an American Indian tribe. Archaeological resources include any material of human life or activities that is at least 100 years old, and that is of archaeological interest.

Mattamuskeet NWR follows these legal mandates to protect the public's interest in preserving the cultural legacy that may potentially occur on the refuge. Whenever construction work is undertaken that involves any excavation with heavy earth-moving equipment, such as tractors, graders, and bulldozers, the refuge contracts with a qualified archaeologist or cultural resources expert to conduct an archaeological survey of the site. The results of these surveys are submitted to the Service's Regional Historic Preservation Officer in Atlanta, Georgia, as well as the State Historic Preservation Office (SHPO), which, in North Carolina, is the Office of Archives and History in the Department of Cultural Resources. The SHPO reviews the surveys and determines whether cultural resources will be impacted, that is, whether any properties listed in or eligible for listing in the National Register of Historic Places will be affected. If cultural resources are actually encountered during construction activities, the refuge is to notify the SHPO immediately.

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. The most important cultural resource site is Mattamuskeet Lodge. The Lodge is on the National List of Historic Places and has been the symbol of the county for decades. The Service closed the Lodge because of structural problems. However, an act passed by Congress in 2006 (H.R. 5094), the "Lake Mattamuskeet Lodge Preservation Act," conveyed the lodge to the State of North Carolina, and permits the state to use the property, adjacent to the refuge headquarters, as a public facility dedicated to the conservation of the natural and cultural resources of North Carolina.

The inhabitants of Hyde County at the time of European settlement were 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 six 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. With its rich soil with an organic topsoil layer, Hyde County has always had a good reputation for agricultural production, especially in corn. People traveled to the county from across the state for corn.

In the early 1800s, the State of North Carolina owned most of Lake Mattamuskeet. In 1825, the State Legislature vested title to the lake to the State Literary Board; further, the board was given authority to improve these lands and sell them to support public education in North Carolina. Thus, in 1837, the board contracted the construction of a seven-mile canal draining Lake Mattamuskeet to Pamlico Sound, using slave labor from Hyde County's plantations. When the canal connecting the lake to the sea was opened, gravity drained the water above sea level into Pamlico Sound (Forrest 1999).

However, since lower portions of the lake were at or below sea level, not all of the lake could drain to the sea. The net effect of the canal was to reduce the size of Lake Mattamuskeet by more than half, from 120,000 to 50,000 acres and decrease its depth from a range of 6–9 feet to 2–3 feet. The state-established Mattamuskeet Drainage District attempted to drain Lake Mattamuskeet completely with more drainage canals and a pumping plant in 1910 to promote crop production. The short-lived community of New Holland, and a hotel the New Holland Inn, were established in the 1910s. However, the cost of maintaining the water levels necessary for crop production exceeded the profits from the crops. In 1932, the developers abandoned the ill-planned, ill-fated operation. The large pumping plant built for the project was first converted by the Civilian Conservation Corps into a hunting lodge and is now Mattamuskeet Lodge.

In 1934, the lake and the surrounding area became Mattamuskeet NWR. The lake attracts large populations of wintering waterfowl and the area is a haven for hunters and birdwatchers.

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. Recreation based on natural and cultural resources is a growing part of the local lifestyle.

SOCIOECONOMIC ENVIRONMENT

Mattamuskeet NWR lies within Hyde County, North Carolina. Hyde County is located in the northeastern part of the state, and is bounded by the Tyrrell County and Albemarle Sound to the north, Beaufort County to the west, and the Pamlico Sound to the south. 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. As a result, the refuge, with its location just north of U.S. Highway 264, has seen greater recreational and public use due to this increase in visitors. However, the region's natural resources of land and water have experienced increasing demands, often with negative impact. As one of the few remaining tracts of intact natural land, the refuge and, consequently, its management considerations, have become even more critical.

For many decades, Hyde County's Ocracoke Island, on the Outer Banks east of Pamlico Sound, has been in the forefront of economic growth and development in 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 significant economic growth 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. 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 Mattamuskeet NWR and its appropriate management is, therefore, easily understood.

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 eight 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 10).

With one major exception (cotton), agricultural commodity production in Hyde County declined from 1997 to 2002 (Table 11). Land in production for corn, soybeans, and wheat decreased, as did hog and cattle inventory and hogs and cattle sold. Land in cotton production, however, increased 444 percent.

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

Table 10. Hyde County agricultural statistics.

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

Source: 2002 USDA Census of Agriculture

Table 11. Commodity production in Hyde County in 2002 and 1997.

Commodity	2002 Production	1997 Production	1997-2002 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%

Source: 2002 and 1997 USDA Census of Agriculture

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). The town of Swan Quarter, population 958, is the county seat. Engelhard is the largest town in the county with a population of 1,561. Most of the population in the county is widely dispersed throughout the rural areas of the county.

The population is about 63 percent white, 35 percent black, two 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 12).

Table 12. 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
Vicinity of Mattamuskeet 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
Perquimans	$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*

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 and fishing, and 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 also forested, so the percentage of land forested in the county is identical to the state. 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 five 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, forest industry owned 15 percent, and the state government owned two percent (USDA Forest Service 2002).

OUTDOOR RECREATION IN THE AREA

Fish and wildlife resources have had a profound effect on recreation in the area. Hyde County has always had plentiful fish and game, due to its diversity and abundance of lands, waters, and habitats. 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 Mattamuskeet National Wildlife Refuge to preserve and restore habitat for native wildlife and migratory birds. The Fish and Wildlife Service also manages the Swanquarter, Pocosin Lakes, and Alligator River national wildlife refuges and the North Carolina Wildlife Resources Commission 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, rivers, and lakes. Swimming in the ocean and sunbathing on the beach are the anchors of recreation on the Outer Banks. Boat ramps provide access to the river and sound. Numerous outfitters provide boats and guided tours. The North Carolina Coastal Plain Paddle Trails Guide lists a trail through the Mattamuskeet National Wildlife Refuges (North Carolina Division of Parks and Recreation 2001). 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.

Heritage tourism and sightseeing are also very important, with sites such as the Lost Colony at Roanoke Island, the Wright Brothers Memorial at Kitty Hawk and Kill Devil Hills, the Cape Hatteras and other lighthouses, and the historic village of Ocracoke all drawing large numbers of tourists from around North Carolina, the East, the USA in general, and even internationally.

A variety of agencies and organizations provide environmental education and interpretation opportunities: the Fish and Wildlife Service at Alligator River, Pocosin Lakes, and Pea Island national wildlife refuges; the National Park Service at Cape Hatteras National Seashore, Fort Raleigh National

Historic Site on Roanoke Island, and the Wright Brothers Memorial; 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.

OUTDOOR RECREATION ECONOMICS

Fish and wildlife are the focus of the refuge, but they are also important to the local economy. A considerable commercial fishery is present in Pamlico Sound and the adjoining streams and canals. Striped bass, red drum, flounder, speckled trout, and gray trout are the major species harvested. Secondly, 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 and sportswomen from outside the county.

Unfortunately, environmental degradation has reduced the viability of valuable fishery spawning grounds and habitat quality for many wildlife species in Lake Mattamuskeet and Pamlico Sound. In recent years, Mattamuskeet NWR has increased efforts to remove silt from canals, which will provide deep water refuge for fish during dry years and provide spawning habitat for species, such as crappie, which require deep water to spawn. The canals also serve as silt traps and when consistently cleaned out can reduce the amount of silt being deposited in Lake Mattamuskeet. Silt reduction in the lake will help improve water clarity and benefit the growth of aquatic plants and the waterfowl and fish which feed on them or use them as cover. Silt reduction may also allow sand spawning areas used by bass and sunfish to remain available to fish for many more years.

In a 2004–2005 study for the Service, an East Carolina University researcher surveyed 1,675 visitors to eight national wildlife refuges in eastern North Carolina and southeastern Virginia—Alligator River, Mackay Island, Pea Island, Roanoke River, Pocosin Lakes, Back Bay, Great Dismal Swamp, and Mattamuskeet (Vogelsong 2006). The study concluded that that these refuges are valuable assets not only to residents of surrounding communities but also as destinations by nonresidents who visit them from afar. In addition to attracting visitors to the region, visitors value the wildlife habitat functions of the refuges and feel that they are a good use of the lands on which they are located. Other highlights of the study (Vogelsong 2006) include the following:

- The majority of respondents at each refuge were white, well educated and fairly affluent.
- Mean household income exceeded $50,000 and mean age was 51 years.
- On average, respondents arrived at the refuges in groups of 2.89 people and in 1.17 vehicles.
- An economic impact analysis revealed that the total direct economic impact in terms of visitor expenditures is estimated as $166,612,257.55. In addition, a significant portion of the $324,620,191.31 spent by visitors not directly associated with the refuge can also be attributed to the presence of the refuges in the region.

- Although refuges are visited by both locals and tourists, approximately two-thirds of the respondents indicated that they considered themselves to be tourists. Additionally, the majority of the sample indicated that the refuges were their primary purpose in visiting the region.

- Only 56 percent of respondents knew that the Service is responsible for managing the refuge they were visiting.

- Respondents indicated that fishing was the number one primary activity they planned to participate in while on their visit. This was followed by bird/wildlife watching, "other," and hunting.

- The majority of visitors to the refuges reported that they were highly satisfied with their visits.

- Visitor desires for additional amenities and or facilities were centered on wildlife. The two potential additions that they ranked highest in terms of increasing their frequency of visitation were additional wildlife viewing opportunities and additional wildlife viewing areas. Additionally, respondents overwhelmingly chose protecting habitat at the expense of visitor services.

The Service has also surveyed all wildlife-dependent recreation participants in North Carolina. There has been a study of visitors to the interpretive facilities of a nongovernment organization in northeastern North Carolina. There are also numerous studies of the economic activity generated by ecotourists and birdwatchers to 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 for hunters, and $199 per day for 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 NWR in Virginia also showed a range of expenditures from $62 to $101 per day (U.S. Environmental Protection Agency 1997).

With improved facilities and staffing, Mattamuskeet NWR can continue to provide important "goods and services" in the economic life of the community. Ecotourism, fishing, wildlife observation and photography, and environmental interpretation are increasingly being seen as a desirable industry throughout the United States and indeed, the world. As the population increases and development spreads—and the number of places left to enjoy wildlife decreases—the refuge will 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 for 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. Manteo also features Roanoke Island Festival Park with a historic visitor's center and the Queen Elizabeth II (a composite design of a 16th-century wooden ship, named after one of the seven vessels that sailed the ocean when Sir Walter Raleigh first brought colonists to Roanoke Island in 1587), Elizabethan Gardens managed by the National Park

Service as a replica of a formal English garden, and Fort Raleigh National Historic Site, the actual site of the first English settlement in the New World.

Other cultural attractions include the National Park Service's Wright Brothers Memorial, Bodie Island Lighthouse, and Cape Hatteras Lighthouse; the 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.

Mattamuskeet NWR serves as an additional attraction to tourists visiting the area. If refuge facilities were improved and staff were available and dedicated to assist visitors, tourism would likely increase in the area. This would 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 for recreation.

U.S. Highway 264 runs just south of the refuge and connects population centers in central North Carolina and Interstate 95 to Hyde County. U.S. Highway 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.

Visitors can reach Mattamuskeet NWR via U.S. Highway 264 or North Carolina Route 94. Most refuge levee roads are not open to vehicular traffic. The refuge has 15 miles of gravel roads. Travel off the roads by foot or boat is primarily limited by a visitors' willingness to exert themselves and their preparedness for mosquitoes, chiggers, and ticks.

CULTURAL SETTING

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. Since 1936, 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, more than 100 of whom disappeared sometime between 1587 and 1590. 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

Mattamuskeet National Wildlife Refuge currently covers 50,180 acres. The approved acquisition boundary is also 50,180 acres.

There are many other protected areas in the vicinity of the refuge that conserve and manage large blocks of land in eastern North Carolina. The Service manages the 16,411-acre Swanquarter NWR, 110,106-acre Pocosin Lakes NWR, and 152,260-acre Alligator River NWR. The North Carolina Wildlife Resources Commission manages a total of 88,217 acres in Tyrrell, Hyde, Dare, and Washington counties, as follows: the Gull Rock Game Land (31,057 acres); Dare County Bombing Range (41,200 acres); Scuppernong Game Land (617 acres); Lantern Acres Game Land (1,825 acres); Pungo River Game Land (614 acres); Bachelor Bay Game Land (5,426 acres); Van Swamp Game Land (5,482 acres); J. Morgan Futch Game Land (600 acres); and New Lake Game Land (1,394 acres).

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 County; 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.

As noted earlier in this chapter, Mattamuskeet NWR is located within North Carolina's designated coastal zone. The Coastal Zone Management Act requires federal agencies in North Carolina to provide the Division of Coastal Management with a consistency determination on their proposed projects and plans. Appendix D contains this determination for the Mattamuskeet NWR CCP.

On Mattamuskeet NWR proper, Service staff conducts a number of activities and programs to conserve and protect land and wildlife resources. With regard to conserving migratory waterfowl, the primary purpose for which the refuge was established in the 1930s, the refuge provides the foraging, sanctuary, and other biological needs of an estimate 20–30 percent of North Carolina's tundra swans (20,000–30,000 swans); 40,000–60,000 northern pintails and green-winged teal; 5,000 Canada geese (the Atlantic population); and 40,000–60,000 other ducks, including 2,000–4,000 black ducks, during fall and winter periods. The staff also protects fish and their habitats, as well as cooperating with universities, the North Carolina Wildlife Resources Commision (NCWRC), and other agencies to monitor fish health. The NCWRC establishes fish creel and length limits on Lake Mattamuskeet for many species, in cooperation with the refuge.

With regard to management of other birds at Mattamuskeet NWR, the refuge conducts winter counts of bald eagles. The refuge staff also participates in the annual Christmas bird count and supports songbird-related studies, which increase knowledge of the status of local and migratory populations of passerine birds, and marsh and wading birds. Active management is undertaken for migrating shorebirds by conducting rotational drawdowns of some of the moist soil units to benefit shorebirds during spring migration.

The only active management of native mammals on the refuge is for white-tailed deer and the reintroduced red wolf. The refuge cooperates with the Southeastern Cooperative Wildlife Disease Study in studies of deer herd health once every five years and with the red wolf recovery program. The refuge also manages other wildlife consistent with refuge purposes. The nonnative nutria is controlled opportunistically. To conserve and protect crustaceans, while allowing for their beneficial use by refuge visitors, a creel limit is in place for the recreational harvest of blue crabs No active management or research is conducted for other aquatic invertebrates. However, assistance is provided to university and state partners involved with studies of reptiles and amphibians.

Table 7 lists the main habitats found at Mattamuskeet NWR. The refuge actively manages or maintains some of these habitats, including open water habitat, freshwater marsh along the lakeshore, moist soil units, forested habitats, and cropland. Lake Mattamuskeet's submerged aquatic vegetation (principally wild celery, redhead grass, and musk grass) are an important part of the open water habitat. Lake Mattamuskeet is filling in with silt and becoming shallower over time with the accumulation of sediments and organic matter. Consistent removal of silt from canals, particularly the canals which drain the lake, will slow down this process. However, over the long term, the open water habitat of the lake will be replaced by marsh habitat.

The refuge also maintains approximately 2,000 acres of moist soil units along the south boundary of the refuge. Common reed (*Phragmites*) is an aggressive invasive plant which is actively controlled by the annual application of herbicide on approximately 350 acres. In addition, approximately 50 acres of alligatorweed are sprayed in canals and impoundments. The moist soil units consist of 11 impoundments. These impoundments are managed on a rotational basis, with some containing water throughout the summer to provide foraging habitat for wading birds, while others are drained in the spring to produce moist soil plants for waterfowl.

Three impoundments totaling 572 acres are managed as semipermanent wetlands. Cypress and gum trees dominate these units but open water, emergent aquatic vegetation, and moist soil plants are interspersed throughout. The units are important breeding areas for wood ducks and are used heavily by foraging wading birds. They are drawn down once every 3 to 5 years to reduce the carp population, allow the trees to increase seed production, and produce moist soil plants.

Approximately 2,436 acres of forested habitats, including mixed pine hardwood (1,210 acres), wet pine flatwoods (960 acres), and cypress gum swamp (266 acres), are located on the refuge. These areas are not actively managed.

Using a cooperative farming program, 291 acres of cropland is annually planted with corn and soybeans. The farmer harvests 50 percent of the crop while the refuge receives 50 percent of the crop, which is left unharvested and standing in the fields for wildlife. In February, after the waterfowl hunting season is over, standing corn in the fields is mowed to increase foraging by waterfowl.

A total of 189 acres of cropland was entered into the Conservation Reserve Program in 2001. The cooperative farmer helps maintain this area as a grassland by mowing the fields once every few years to prevent succession to forest.

The refuge protects 50,180 acres of land and waters. All lands within the refuge's approved acquisition boundary have already been acquired. However, there are minor acquisition needs including the purchase of current access easements and leases, such as access to the Lake Landing Area and the Rose Bay boat ramp. Acquisition to provide road access from North Lake Road to the MI-11 or MI-10 impoundments should also be considered. None of these purchases would constitute more than a minor boundary expansion and would only be acquired from willing sellers.

The refuge also manages cultural resources in compliance with Section 106 of the National Historic Preservation Act through cooperation with the Service's Regional Historic Preservation Officer and the North Carolina State Historic Preservation Office, which requires surveys for cultural resources that may be impacted by undertakings involving excavation on the refuge. The refuge has many important and significant historic and cultural resources, especially related to the intensive efforts in the last century to promote agriculture and settlement in the local area by draining the lake and converting the lakebed to cultivated farmland.

Mattamuskeet NWR staff cooperated with the State of North Carolina and historic preservation interests in the preservation of the historic Mattamuskeet Lodge through the transfer of the lodge and the surrounding 6.25 acres to the State of North Carolina on August 17, 2007. Federal legislation, which authorized this transfer, stipulated that the restoration and use of the facility shall promote environmental and historical interpretation and education.

VISITOR SERVICES

The five-mile-long State Highway 94 causeway across Lake Mattamuskeet is the most visited area on the refuge. Two fishing piers, a wildlife observation platform with viewing telescope, and five bridges are available for public use and are frequented by fishermen and bird watchers. This area is the only portion of the refuge which is available for night use.

Water control structures on the Central, Lake Landing, and Waupoppin canals are popular sites for catching blue crabs and fishing.

A photography blind along the shore of Lake Mattamuskeet is located along the west side of Central Canal and provides good opportunities to photograph wading birds and waterfowl.

The two-mile-long Entrance Road and adjoining 1.5-mile-long Wildlife Drive offer a close-up view of a managed wetland impoundment. Turtles, nutria, and wading birds are often observed throughout the year, while large numbers of ducks, coots, and swan frequent the area in the winter.

Lake Mattamuskeet is available for fishing, canoeing, and kayaking from March 1 through October 30. Two public boat ramps are available, one on Central Canal near the refuge office and the other on the west side of the lake on Rose Bay Canal. The lake is closed to boats during the winter to prevent disturbance to waterfowl.

Fishing
Mattamuskeet NWR receives 18,000 anglers annually. Most people fish along canal banks, bridges, or the Highway 94 causeway. Boaters mostly use the lake in the spring and fall when water depths in the shallow lake are generally the highest. Boat fishermen generally seek largemouth and striped bass, while bank fishermen mostly seek catfish, white perch, and crappie. Crappie fishing is especially popular in the spring when spawning fish move into the deeper canals attached to the lake.

Blue crab fishing at the water control structures and bridges is extremely popular from May through October and is enjoyed by all age groups. Bow fishing for carp and other rough fish is permitted in accordance with state regulations.

Hunting
Quota hunting for white-tailed deer and waterfowl is allowed on portions of the refuge. The Service selects hunters through a random drawing of applicants for deer and resident goose hunting. The State of North Carolina receives application requests for waterfowl hunting on the refuge through their

Special Hunts Program. Hunting for white-tailed deer and resident Canada geese is primarily conducted to control population levels.

The refuge provides 100 permits for resident Canada goose hunting from Monday through Saturday throughout the state's September season. The goose hunts are conducted in September to prevent harvest of migratory geese. The refuge holds two two-day mid-week permit deer hunts in October, of which each hunt allows 150 hunters. The deer hunts are conducted in October to prevent disturbance to wintering waterfowl.

The refuge waterfowl hunts occur in twelve two-day periods from mid-December through January. A total of 192 permits are issued each year; however, permit holders may bring two guests so the actual number of waterfowl hunters is approximately 500. In recent years, application requests for the waterfowl hunt have been between 1,300 and 1,500. As a result, the refuge asked the NCWRC to manage the application process as part of their Special Hunts Program as the refuge did not have adequate staff to manage this part of the hunt program. Waterfowl hunting occurs at sixteen blinds along three miles of shoreline on the south side of Lake Mattamuskeet.

A youth waterfowl hunt is conducted on the Friday and Saturday after Thanksgiving. Sixteen youth are selected and are allowed to bring a friend and parent. The youths are also provided a tour of the refuge and taught basic waterfowl identification skills.

Wildlife Observation and Photography
During the fall and winter, concentrations of Canada geese, tundra swans, and ducks of many species are a delight to both wildlife observers and photographers. The formerly threatened bald eagle may also be observed during the fall, winter, and early spring. During the summer months, many species of songbirds and marsh birds are a common sight. Occasionally, broods of black and wood ducks can be observed in the canals and around the lake's edge. Osprey, wood duck, and bald eagle nests are occasionally visible. Year-round residents include the white-tailed deer, marsh and cottontail rabbits, gray squirrels, and many other mammals, as well as amphibians and reptiles. Species less observed are the bobcat and river otter.

The black bear population in northeastern North Carolina is one of the largest on the East Coast and lucky visitors to the refuge occasionally glimpse a wild bear. More fortunate visitors observe a red wolf or an alligator; however, these observations are usually a result of just being in the right place at the right time. Birdwatching is a major attraction due to the wintering and migrating waterfowl; however, there is also a wide variety of wading birds and songbirds on the refuge. A number of plant species, terrestrial and hydrophytic, as well as the large mature loblolly pine trees of the Sayler's Ridge Natural Area along Rose Bay Canal, are also readily observed.

Tens of thousands of visitors take advantage of the opportunity to observe and photograph wildlife at the refuge. Opportunities to observe waterfowl and wading birds in Lake Mattamuskeet and refuge impoundments are available along the Highway 94 causeway and observation platform over the lake, the refuge entrance road, and the wildlife drive along on the back side of the Entrance Road impoundment. Boating, canoeing, and kayaking opportunities are available for unique wildlife observation opportunities. There is an eight-mile paddling trail in Lake Mattamuskeet for canoeists, kayakers, and rowers.

Environmental Education
Mattamuskeet NWR does not currently offer planned environmental education programs because there is no environmental educator or park ranger on staff. Onsite tours are provided at the request of teachers if staff is available at the time of the request. University professors also utilize the refuge

as an outdoor classroom and research site. The refuge currently has no visitor center or education facilities. The administrative office is on the refuge next to Mattamuskeet Lodge and has literature about the refuge for sale and viewing. The refuge participates actively in an intern program, affording more specific environmental education opportunities to college students. The bookstore at the Pea Island NWR on the Outer Banks of Dare County offers numerous books on the wildlife specific to Mattamuskeet NWR.

The Mattamuskeet Lodge is currently being renovated by the NCWRC and a new refuge office with a visitor contact area is also under construction. These two facilities should create new opportunities to enhance the environmental education program.

Interpretation
Annually, six thousand users visit the interpretive kiosks along the refuge Entrance Road and at the Highway 94 wildlife viewing platform. Additional kiosks explaining the history of Lake Mattamuskeet and the Mattamuskeet Lodge are situated between the lodge and the headquarters. Pamphlets providing information on the refuge are available at the refuge headquarters.

The refuge staff conducts approximately 10 tours annually of the moist soil unit impoundments to view wintering waterfowl. Birding clubs, conservation groups, and school groups comprise most of the tours.

Public Outreach and Involvement
Volunteers from the general public or organizations are welcomed to the refuge. The refuge offers special educational opportunities to the scores of local residents and visitors who volunteer to assist the refuge with projects.

An intern program provides unique experiences for college students and graduates geared towards careers in environmental sciences. This program also 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 enlightened, intelligent management of natural resources.

The staff organizes, promotes, and conducts one open house annually, issues four to seven news releases, maintains three websites, and collaborates with the news media.

PERSONNEL, OPERATIONS, AND MAINTENANCE

The staff at Mattamuskeet NWR also manages the Swanquarter and Cedar Island NWRs. Approximately eight permanent full-time employees work at Mattamuskeet NWR, 85 percent or more of their time. The refuge's current staffing and positions are shown in Table 13.

Mattamuskeet NWR enjoys productive partnerships with the NCWRC, Partnership for the Sounds, The Nature Conservancy, Mattamuskeet Foundation, Hyde County, Ducks Unlimited, East Carolina University, North Carolina Department of Corrections, and about 10 volunteers.

At present, the refuge headquarters and visitor contact station are in a small building and attached trailer about two hundreds yards from Mattamuskeet Lodge (Figure 2). A short distance from the office, the refuge also maintains several Civilian Conservation Corps-era buildings and four private single-family dwellings, which are used as staff housing. By 2010, a new shop, office, and two residences are planned to be completed.

Table 13. Staff of Mattamuskeet, Swanquarter, and Cedar Island NWRs, 2005.

Position	Status	% of time on Mattamuskeet	% of time on Swanquarter	% 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	43	5	2
Administrative Support Assistant, GS-0303-09	PFT	92	3	5
Heavy Mobile Equipment Operator, WG-5803-10	PFT	100	0	0
Engineering Equipment 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	80	10	10

PFT = permanent full time, TFT = temporary full time, Fire = funded by fire budget
** Law Enforcement position is shared with Pocosin Lakes National Wildlife Refuge*

III. Plan Development

PLANNING PROCESS AND PUBLIC INVOLVEMENT

In accordance with Service guidelines and National Environmental Policy Act recommendations, public involvement has been a crucial factor throughout the development of the Comprehensive Conservation Plan for Mattamuskeet National Wildlife Refuge. This plan 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 the refuge. The Service, as a whole, and the refuge staff, in particular, are very grateful to each individual 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.

Prior to the start of the planning process, the Service published a Notice of Intent to prepare a CCP for Mattamuskeet National Wildlife Refuge in the *Federal Register* on November 3, 2000 (65 FR 66256). Public scoping was originally conducted in 2001 and reinitiated in June 2007, after the CCP process was temporarily halted. A biological review was carried out in July 2002, for all the national wildlife refuges, including Mattamuskeet, in the Roanoke-Tar-Neuse-Cape Fear Ecosystem of northeastern North Carolina and southeastern Virginia. A diverse team of federal and state personnel undertook a holistic examination of habitat and wildlife management programs at these refuges, including Mattamuskeet NWR. The team then considered how the refuge might fit into accomplishing a number of relevant system-wide and landscape conservation needs. The biological review team included staff from the refuge, as well as Service fish and wildlife biologists from the Division of Ecological Services and Division of Migratory Birds. In addition, wildlife biologists from the North Carolina Wildlife Resources Commission (NCWRC) participated. The team's recommendations, goals, objectives, and strategies set forth in its July 2002 report entitled, *Biological Review of National Wildlife Refuges of the Roanoke-Tar-Neuse-Cape Fear Ecosystem in Northeastern North Carolina and Southeastern Virginia*, were instrumental in the planning process.

In addition, a vsitor services review was conducted in December 2006 by public use and outreach specialists from the Service's Southeast Regional Office and two other refuges in Region 4. The visitor services review team toured the refuge, identified and discussed the current status of its public use programs, debated the merits of various recommendations for enhancing and improving these programs, and prepared a report listing and prioritizing its recommendations.

The core CCP planning team, which consisted of the refuge manager, assistant refuge manager, and a contractor with experience in comprehensive conservation planning met for the first time in March 2007, for a tour of the refuge and an overview of its habitat and wildlife resources, public use programs, facilities, and opportunities. The core planning team also conducted additional internal scoping and prepared a preliminary schedule and plans for public involvement. The core planning team developed a mailing list of the public, landowners, state and tribal agencies, nonprofit organizations, and local governments. Letters were sent notifying these parties of the planning process being initiated, and encouraging their participation in the scoping of issues in preparation for developing the CCP for this refuge.

The North Carolina Wildlife Resources Commission (NCWRC) was invited in July 2007 to join the planning team tasked with preparing the CCP. The NCWRC had earlier participated in the biological review. Three representatives of the NCWRC contributed to the development of the vision, goals,

objectives, and management alternatives for the Draft CCP/EA, including the district fishery biologist; waterfowl biologist; and a staff person from the Outer Banks Center for Wildlife Education. The North Carolina Division of Coastal Management, East Carolina University, North Carolina Cooperative Extensive Service, Partnership for the Sound, and The Nature Conservancy were also represented on the CCP planning team and helped craft the vision, goals, objectives, and management alternatives for the plan. Appendix E, Public Involvement, and Appendix L, Consultation and Coordination, provide additional information on the planning process.

SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

The planning team considered federal and state mandates, as well as applicable local ordinances, regulations, and plans. It identified the following issues, concerns, and opportunities related to fish and wildlife conservation, habitat enhancement, restoration, recreation, and management of threatened and endangered species:

- Wildlife species of management concern, including:
    - Tundra swan
    - Canada goose
    - Snow goose
    - American black duck
    - Northern pintail
    - Canvasback
    - Wood duck
    - Brown-headed nuthatch
    - Black-throated green warbler
    - King rail
    - Yellow rail
    - Solitary sandpiper
    - Semi-palmated sandpiper
    - Short-billed dowitcher
    - Peregrine falcon
    - Bald eagle
    - Osprey

- Maintaining and managing diverse habitats, including open water, wet pine flatwoods, moist soil units, natural lake shoreline, cypress-gum swamp, cropland, nonriverine swamp forest (mature loblolly pine)

- Providing the water quality, quantity, salinity, and vegetative composition most conducive to meeting the foraging, loafing, sanctuary, pair-bonding, molting, and cover requirements of ducks, geese, swans and wading/marsh birds of the Atlantic Flyway, especially tundra swans, northern pintails, and green-winged teal.

- Loss of open water on the Lake Mattamuskeet.

- Control of invasive species such as phragmites and cattails.

- Worn-out or dysfunctional pumps and pump stations that inhibit adequate water manipulation on impoundments and moist soil units.

- Forest management including thinning, planting of oaks, and group selection silvicultural system to ensure a future oak component and mast production.

- Managing prescribed fire and monitoring effects on wildlife and habitat.

- Management of the six priority public uses of the Refuge System: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

- Management of nonpriority public uses such as canoeing, hiking, and picnicking.

- Resource protection, including cultural resources, water and lake quality, sedimentation, pest control.

- Law enforcement issues, including hunting violations, fishing/boating violations, dumping/littering, poaching, reptile collecting, trespass, vandalism, drug and alcohol abuse, drainage ditches, and wildlife disturbance.

- Reduce illegal artifact collecting.

- Review cropland management and explore options for grassland and old field management.

The planning team also directed the process of obtaining public input through public scoping meetings, open planning team meetings, comment forms, and personal contacts. All public and advisory team comments were considered in drafting the CCP; 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 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. The significant issues that were identified from the 2001 and 2007 public scoping periods are summarized below.

FISH AND WILDLIFE POPULATION MANAGEMENT

- Announce waterfowl migration updates on local news
- Continue conducting research on black bears to determine home range and harvest potential
- Continue surveys and monitoring
- Control nutria in canals
- Develop a trapping program for furbearers, predators, beavers, and nutria
- Develop beaver management guidance
- Develop species list for all fish using the lake
- Evaluate food chain impacts of fire ants on other species
- Evaluate water management impacts to fish and wildlife on each refuge
- Examine water quality and silting in canals leading to the lake
- Improve fish access to the lake
- Speed up beaver eradication
- Stock Florida largemouth bass in the lake
- Study and evaluate anadromous fish populations
- Use money to raise ducks and geese

- Quit importing predators such as eagles (bald and golden), red wolves, coyotes, alligators; these species are a destroyer of our main wildlife species: ducks, geese, deer, quail, wild turkeys, rabbits, etc.
- Allow more or longer deer hunting on refuge for population control
- Conduct annual restocking with various species of fish
- Allow trapping of nonnative and native animals species such as nutria and beaver

HABITAT MANAGEMENT

- Clean out and regularly maintain duck boxes
- Connect larger blocks of land through corridors for black bear
- Control nonnative and invasive species like the common reed
- Coordinate with local landowners to maintain lake at appropriate levels
- Coordinate with nonprofit agencies to ensure that land conservation needs are met
- Determine whether FWS is purposely flooding adjacent land
- Determine whether high lake levels are converting adjacent uplands to wetlands
- Evaluate need for increased growth of cypress around lake
- Evaluate the impacts to adjacent landowners from management practices
- Improve fish habitat
- Increase current eradication budget
- Lower water levels in the lake
- Monitor effect of water levels on duck populations in the lake
- Increase funding to accommodate programs
- Provide education on how the lake works and the role FWS plays in lake level maintenance
- Review and coordinate on the Wetland Reserve Program
- Study summertime water temperature and DO (dissolved oxygen) in canals
- Survey canals for deepwater habitat
- Blast canals with dynamite
- Clean out silted canals to restore their water carrying capacity
- Conduct commercial thinnings
- Conduct regular prescribed burns
- Consider a ‘refuge workday’
- Control beavers to help control ditch problems
- Cooperate with other agencies to share all available data
- Coordinate with NCWRC to provide early successional habitat for bobwhite quail
- Engage in cooperative research efforts with other agencies (i.e., black bear)
- Evaluate data for use in general management
- Evaluate salt intrusion into lake from water control gates
- Evaluate the size and effectiveness of existing firebreaks
- Evaluate the validity of timber harvest for the purpose of fire control
- Include people in the planning process
- Increase data collection efforts
- Involve local citizens from each county in the planning process
- Maximize wildlife benefits inside impoundments, using mechanical and chemical means
- Obtain more funding to manage land in possession
- Obtain staff and equipment to fully implement prescribed burn program
- Re-design water control gates
- Speed up structure replacement process by using old design

- Use fire in the role it played naturally
- Use forestry techniques such as thinnings, for support and benefit of wildlife
- Prevent saltwater intrusion into the lake
- Address strange weed problems
- Address drainage to the lake and drainage from the lake
- Study and manage appropriate lake water level
- Address wash on NC 94 Lake Road by maintaining with vegetation and rock
- Procure funding for continued maintenance of the four main outfall canals to the lake
- Repair dikes where damaged
- Maintain water control structures or replace using good low country engineering technology
- Consider more water control structures
- Seek more federal funds for canal maintenance and prioritize monies received towards this maintenance rather than habitat enhancement
- Expand control of nonnative plant species such as phragmites
- Do a better job managing the forest resources
- Use a conservation outlook and strategy, not preservation
- Continue to allow private landowners to maintain their individual drainways to the lake and manage lake water levels so as not to impede drainage of surrounding private lands

RESOURCE PROTECTION

- Acquire more land
- Charge reasonable and low user fees to offset tax losses, returning them to the county
- Consider buying more easements
- Control trespassing
- Control waterfowl baiting on adjacent land
- Cooperate to obtain funding for improved wildlife management, rather than acquisition
- Cooperate with private landowners to manage land for wildlife
- Coordinate with county managers
- Coordinate with other agencies prior to acting on land management practices
- Create more wilderness
- Create wilderness areas
- Create wildlife corridors
- Develop a connecting corridor between Swanquarter and Mattamuskeet, through acquisition
- Develop and enforce a ‘no wake zone’ within 300 feet of other boats
- Develop economic cost/benefit analysis of the refuge’s impact on local economy
- Develop education program on other refuges in the area
- Develop public use education programs on what wilderness designations mean
- Do not acquire more land
- Do not consider corridors in refuge management
- Do not create more wilderness
- Evaluate and educate public on tax revenue cost sharing program
- Evaluate economic magnitude of current income producing refuge public uses
- Evaluate management limitations of wilderness designations
- Evaluate the condition of continuously flooded uplands adjacent to the lake
- Improve lake safety
- Include history and interpretative material on the lake, the lodge, and surrounding area
- Incorporate local culture and heritage of the area into refuge programs

- Increase law enforcement
- Maintain existing lands with current budget
- Prohibit certain size boats and motors on the lake
- Provide lists of permitted activities in wilderness areas
- Re-evaluate existing surveys used to acquire private property
- Restore Mattamuskeet Lodge
- Secure funds for lodge restoration
- Transfer lodge ownership to another agency
- Use advice from local experts when developing plans

VISITOR SERVICES

- Add a boat ramp on NC 94
- Champion ecotourism
- Allow horseback riding
- Allow nighttime bass fishing in the summer
- Attract ecotourism
- Consider rotating or moving blind to varying locations
- Consider sailing, kayaking, canoeing on lake
- Consider windsurfing, remote control model boats
- Continue other public use activities
- Continue providing access to Bell Island fishing
- Continue use of the lodge
- Coordinate with NCWRC in managing the black bear hunts
- Coordinate with NCWRC on hunting activities
- Determine whether mountain bikes could use the road system
- Develop appropriate signage indicating where existing facilities are
- Develop canoe and kayak trails for public use
- Develop more public facilities
- Develop other areas on the refuge for hunting
- Develop program to improve view of the lake by eradicating common reed
- Develop public education programs on positive effects of refuge management practices
- Develop public school programs on wilderness area
- Don’t dig a ditch to catch mud around new boat ramps
- Educate and involve more youth in hunting programs
- Evaluate camping platform needs for outfitters
- Evaluate the potential for quail hunting on the refuge
- Expand public uses other than hunting and fishing
- Improve existing blind
- Improve public outreach to reduce general feelings of mistrust
- Increase education and outreach
- Increase facilities and programs
- Increase hiking trails
- Increase programs to attract more people
- Increase public access
- Increase public waterfowl hunting
- Increase refuge involvement with public use activities
- Increase signage regarding road access

- Increase the number of duck blinds
- Increase volunteer program
- Maintain east side of the causeway to improve view
- Make more roads available
- Make public use more convenient
- Open the refuge roads and trails to horseback riding
- Prohibit certain size boats and motors on the lake
- Recognize the importance of the refuge to Hyde County
- Renovate the lodge or surrender it to another agency
- Post signage for swan observation
- Bring back Nature Week, which was an environmental educational day camp begun about 1988 for grades 1-5.
- Implement other environmental education programs to bring the public to the Refuge to watch and know about Nature.

REFUGE ADMINISTRATION

- Fully staff the refuge
- Separate management of Mattamuskeet and Swanquarter from Cedar Island
- Keep management styles flexible
- Utilize volunteers for maintenance, manpower and equipment
- Work with other agencies to maximize the benefit of their work
- Provide more competitive salaries
- Use funds for better maintenance instead of acquisition
- Maintain the infrastructure of the lake: canals, dikes, water control structures & pumps
- Staff has greatly improved relations between the refuge and area residents and should continue to do so.

Appendix E, Public Involvement, provides additional information on the public scoping process.

WILDERNESS REVIEW

Refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process. The results of the wilderness review are included in Appendix I.

In sum, no lands at Mattamuskeet NWR meet the stringent criteria for being designated by Congress as part of the National Wilderness Preservation System. The refuge does not contain 5,000 contiguous roadless acres, nor does it "generally appear to have been influenced primarily by the forces of nature, with the imprint of man's work substantially unnoticeable."

PUBLIC REVIEW OF THE DRAFT CCP/EA

A Notice of Availability of the Draft CCP/EA for Mattamuskeet National Wildlife Refuge for public review and comment was published in the *Federal Register* on July 18, 2008 (73 FR 41371). The Draft CCP/EA was made available for public review from July 18 to August 18, 2008. A total of 19 comment letters were received from this public review. Fourteen of the letters were submitted by private citizens; four were from state agencies; and one was from the Hyde County Chamber of Commerce. These public review comments and the Service's responses to them are provided in Appendix E, Public Involvement.

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 National Wildlife Refuge System Improvement Act of 1997 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 above-mentioned Act identified hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation as priority wildlife-dependent public uses of the Refuge System. Hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are therefore emphasized in this plan.

Described below is the Service's proposed comprehensive conservation plan for managing Mattamuskeet National Wildlife Refuge over the next 15 years. This proposed management direction contains the goals, objectives, and strategies that will be used to achieve the refuge vision.

Three alternatives for managing the refuge were considered in the Draft Comprehensive Conservation Plan and Environmental Assessment: Alternative A, Current Management Direction (No Action Alternative); Alternative B, the Proposed Action; and Alternative C, Moderately Expanded Program. Each of these alternatives was described in the Alternatives section of the Environmental Assessment. The Service chose Alternative B as its preferred management direction.

Implementing the preferred alternative will not result in major changes to either administration of the refuge or the types of wildlife, habitat, and public uses found there. A number of programs and efforts will be enhanced, with the expected outcome that wildlife, habitat, and people will all benefit to some degree.

VISION

The vision for Mattamuskeet National Wildlife Refuge is as follows:

Mattamuskeet National Wildlife Refuge will function as a vital part of National Wildlife Refuge System to remain a premier wintering area for ducks, geese, and swans on the Atlantic Flyway. The refuge will maintain breeding habitat for a variety of migratory birds, will maintain an extensive network of moist soil units, and will protect and enhance healthy wetland and aquatic ecosystems, while considering and striving to mitigate the effects of climate change and rising sea levels. It will also protect Service trust species, including threatened and endangered species.

The refuge will continue to provide quality recreation opportunities for hunting and fishing, and will increase public use in wildlife observation and environmental education and interpretation. The refuge staff will cooperate with partners and volunteers to achieve the refuge's goals. The Fish and Wildlife Service will continue to conduct research in cooperation with government agencies, nongovernmental agencies, universities, and others. The refuge will have adequate staff and facilities to realize this vision.

GOALS, OBJECTIVES, AND STRATEGIES

The goals, objectives, and strategies presented below are the Service's responses to the issues, concerns, and needs expressed by the planning team, the refuge staff and partners, and the public.

They are presented in a hierarchical format. 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 National Wildlife Refuge System Improvement Act, the mission of the Refuge System, and the purposes and vision of Mattamuskeet NWR. The Service intends to accomplish these goals, objectives, and strategies within the next 15 years.

FISH AND WILDLIFE POPULATION MANAGEMENT

Goal 1: Maintain, enhance, and where necessary, restore healthy populations of migratory birds, wildlife, and fish, including federal and state endangered and threatened species.

This goal is explicitly derived from the purposes of Mattamuskeet NWR, emanating from several different legal authorities, which direct the refuge to protect and conserve migratory birds and other wildlife resources.

Objective 1-1: Migratory Waterfowl – Provide the foraging, sanctuary, and other biological needs of 20–30 percent of North Carolina's tundra swans (15,000–26,000); 40,000–60,000 northern pintails and American green-winged teal; 10,000 Canada geese (Atlantic Population); and 80,000–120,000 other ducks, including 2,000–4,000 black ducks, during fall and winter periods.

Discussion: As pointed out in Chapter II, Mattamuskeet NWR makes a very important contribution to wintering swan, duck, and goose populations in North Carolina. At present, the refuge provides for the foraging, sanctuary, and other biological needs of approximately 20–30 percent of North Carolina's tundra swans (15,000–26,000 swans); 40,000–60,000 northern pintails and American green-winged teal; 5,000 Canada geese (Atlantic Population); and 40,000–60,000 other ducks, including 2,000–4,000 black ducks, during fall and winter periods. Thus, this objective would maintain the refuge's capacity for North Carolina's tundra swans, northern pintails, and American green-winged teal, but increase the refuge's capacity to provide foraging, sanctuary, and other biological needs of migratory Canada geese and ducks other than northern pintail, American green-winged teal, and black duck, including American wigeon, mallard, ring-necked duck, gadwall, northern shoveler, redhead, canvasback, and lesser scaup.

Strategies:

- Continue to conduct monthly aerial and ground surveys during the migration period (October–March) annually. Consider bimonthly surveys.

- Continue to conduct midwinter waterfowl survey.

- Continue to conduct the tundra swan productivity survey following guidelines set forth in the standard operating procedures, which are provided by the Ad Hoc Eastern Population Tundra Swan Committee.

- Continue to monitor trends in the resident Canada goose population on the refuge and take actions to reduce this population if migratory waterfowl are negatively impacted.

- Continue to collect harvest data on waterfowl collected during public hunts.

- Continue to conduct preseason wood duck banding annually.
- Conduct winter banding and marking of tundra swans, Canada geese, and ducks as requested.
- Assist cooperating agencies and universities with studies as needed.
- Conduct needed research projects related to waterfowl.
- Continue to maintain and monitor 100 wood duck nest boxes during the nesting season (February–July).
- Construct and erect new wood duck boxes as needed.
- Monitor and investigate mortality of tundra swan and other species from disease annually.
- Note unusual waterfowl observations by the staff and the public.
- Intensively manage moist soil impoundments to benefit waterfowl.
- Maintain and intensively manage crop fields to benefit waterfowl and provide high-calorie foods (hot foods) during late winter.
- Maintain winter closure of public access to eastern impoundments and the back levees of the western impoundments to limit disturbance to waterfowl. Also, limit guided tours to these impoundment areas to no more than one tour per week to each area during the winter closure period.
- Monitor the increasing lesser snow goose population on the refuge and study/observe possible negative impacts to other migratory waterfowl. If necessary, develop strategy to reduce negative impacts.

Objective 1-2: Fish – Continue to protect fish and their habitats and expand cooperation with universities and other agencies to monitor fish population status; increase applied research especially with regard to baseline surveys and carp management.

Discussion: The refuge supports several categories of fish species, including residents, migratory, anadromous, and one catadromous species. Resident species, such as largemouth bass, black crappie, white bass (white perch), a variety of sunfish (bream), and catfish inhabit Lake Mattamuskeet and the associated canals on the refuge. These and other freshwater species provide a large portion of the diet of migratory species, which are important to both sport and commercial fishermen. 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 estuary, inhabit these areas as juveniles, mature offshore, and return to these streams to spawn as adults. These species include striped bass, alewife, and blueback herring. The American eel, *Anguilla rostrata*, is the primary catadromous species on the refuge. This species spawns in the Sargasso Sea, travels to the East Coast of the United States, and matures in freshwater streams and lakes.

Strategies:

- Protect and monitor anadromous and catadromous fish and their habitats associated with Lake Mattamuskeet.

- Monitor fish health periodically in cooperation with cooperating agencies and universities.

- Cooperate with agencies and universities to conduct baseline surveys of waters on the refuge to document species composition.

- Remove silt from outlet and "rim" canals to maintain and restore deepwater habitat necessary for many fish species during droughts as well as spawning crappie. Also, needed to prevent buildup of silt in Lake Mattamuskeet which contributes to lake turbidity and reduces the availability of sandy areas used by spawning bass and sunfish.

- Implement fish stocking as needed and in cooperation with the North Carolina Wildlife Resources Commission (NCWRC), especially for largemouth bass.

- Increase enforcement of size and creel limits.

Objective 1-3: Crustaceans – Maintain existing creel limit for recreational blue crab harvest and continue to prohibit crab pots on the refuge. In addition, work with the Coastal Habitat Protection Plan (CHPP) to assure appropriate regulatory protection for the outlet canals.

Discussion: The blue crab is common in North Carolina coastal waters, including Pamlico Sound and tributaries. Its harvest is important both commercially and recreationally in the state; in 2004 over 34 million pounds of blue crabs were harvested commercially, with a dockside value of $23 million, the highest of any commercial finfish or shellfish in North Carolina (Division of Marine Fisheries 2007).

The refuge supports a healthy blue crab population and a popular recreational crab harvest only (no commercial harvest). Crabbing is conducted from canal banks and water control structures. Refuge regulations prohibit crab pots, and only five hand lines and/or hand-activated pots per person are permitted at any one time. The possession (creel) limit is 12 blue crabs per person per day and the minimum length (width) limit is fives inches from point to point of the carapace (shell). Crabs caught on the refuge are for personal use only and may not be sold.

Strategies:

- Ensure a law enforcement presence on the refuge during crab and fishing season to encourage compliance with creel limits.

- Actively cooperate with the North Carolina Division of Marine Fisheries in conservation and management of this important species on the refuge.

- Ensure that signs listing creel limits are posted and visible at popular crab fishing sites and that fishing regulation brochures are readily available.

- Cooperate with agencies and universities to study the impact on the refuge blue crab population due to the commercial harvest of blue crabs in the four outlet canals between Lake Mattamuskeet and Pamlico Sound.

Objective 1-4: Aquatic Invertebrates – Assist partners with studies and conduct periodic baseline surveys of invertebrates in managed wetlands (moist soil units).

Discussion: The CCP improves on the current management by collecting baseline data of invertebrate species occurrence in the managed wetlands as funding allows. These invertebrates are important sources of food and protein for all birds that use moist soil units, including ducks, shorebirds, and wading birds.

Strategies:

- Initiate development of baseline data of invertebrate species occurrence in the managed wetlands as funding allows.
- Manage refuge resources to protect invertebrate species.
- Assist cooperating agencies and universities with studies as needed.

Objective 1-5: Raptors – Continue winter counts of eagles on refuge. Reinitiate nest counts of ospreys. Increase habitat management of cropland in Conservation Reserve Program (CRP).

Discussion: Bald eagles and ospreys have historically nested on the refuge and viable nests of osprey continue at present. The refuge conducts midwinter counts of bald eagles that congregate around Lake Mattamuskeet. Staff used to carry out counts of nesting osprey, but these were discontinued when the biologist position was eliminated. Under this objective, osprey nest counts would be resumed once the biologist position is restored.

Strategies:

- Continue to use same protocols for counting eagles, so that methodology is consistent and results over the years can be compared to establish trends.
- Use same protocol for nest counts of osprey as before, for the sake of continuity and to be able to establish trends, if any, over time. If newer or improved census methodologies have become available, evaluate these and whether they can be integrated with earlier methodologies prior to implementing.
- When feasible and indicated, cooperate with partners on these endeavors.
- Compile, evaluate, store, and publish or publicize trends over time.
- Explore ways to improve management of CRP grassland to increase foraging value for raptors.

Objective 1-6: Passerine Birds – Continue to participate in annual Christmas bird count and support passerine-related studies on refuge. Also, implement passerine point counts in different refuge habitats to evaluate habitat management actions.

Discussion: The perching (passerine) species that breed on the refuge include warblers, nuthatches, thrashers, and blue-gray gnatcatchers. The most common wintering species are the American robin, yellow-rumped warbler, red-winged blackbird, and five or more species of sparrows.

Being situated in the path of the Atlantic Flyway, a major migration route running north and south along the Atlantic Seaboard of North America, the refuge provides resting and foraging areas for many transient species, that is, migratory birds which winter farther south. Among the passerines that do so are the tree swallow, warblers (yellow, black-throated blue, northern parula, black and white, and palm), bobolink, Baltimore oriole, American redstart, and oven bird.

This CCP substantially improves on the current management by proposing to perform point counts on all major habitat types, monitor land bird response to habitat management when additional staff is available, and monitor and maintain 20 to 40 prothonotary warbler nest boxes annually.

Strategies:

- Conduct point counts to collect data on habitats in addition to the wet pine flatwoods habitat when additional staff is available.
- Continue to participate in annual Christmas bird count.
- Monitor land bird response to habitat management when additional staff is available.
- Install, monitor, and maintain 20 to 40 prothonotary warbler nest boxes annually.
- Record unusual land bird observations by the staff and the public.
- Encourage participation by volunteers and partners.
- Cooperate with other agencies and universities to conduct studies.

Objective 1-7: Shorebirds – Manage one or two moist soil units (rotating) to benefit shorebirds during spring migration. In addition, evaluate alternative strategies to manage a portion of moist soil units to benefit fall migration of shorebirds. Also, conduct surveys of managed areas.

Discussion: The refuge provides habitat which benefits a host of shorebirds, including dowitchers, dunlins, plovers, sandpipers, and yellowlegs. Shorebirds forage for aquatic invertebrates in the moist and saturated soils of mudflats and vegetated wetlands. Shorebird diets consist of polychaete and oligochaete worms, insect larva, and aquatic insects, such as water boatmen. Other food items include amphipods, copepods, crustaceans, and mollusks.

Strategies:

- Conduct spring (April–June) and fall (July–September) ground surveys every 10 days in suitable habitat annually.
- Participate in annual Christmas bird count.
- Note unusual shorebird observations by the staff and the public.
- Manage water levels of at least 10 percent of impoundment acreage to provide foraging habitat for migrating shorebirds.

- Moist soil unit being managed to benefit shorebirds during spring migration should be drawn down slowly between early April and late May.

Objective 1-8: Marsh and Wading Birds – Continue to participate in Christmas bird count. In addition, reinstitute ground surveys for marsh and wading birds.

Discussion: Mattamuskeet NWR furnishes open water, mudflat, marsh, and wetland habitat that benefit many species of marsh and wading birds. Marsh birds that either breed on, migrate through, or winter at the refuge include the American and least bitterns; white and glossy ibis; American coot; pied-billed grebe; king, Virginia and sora rails. Wading birds found on the refuge include the great, snowy, and cattle egrets and the great blue, green, little blue, tri-colored, and black-crowned night herons.

Strategies:

- Conduct breeding season (April–May) callback survey for marsh birds every 10 days along two survey routes in managed impoundments and along lakeshores.
- Participate in annual Christmas bird count.
- Note unusual marsh and wading bird observations by the staff and the public.
- Conduct spring and summer surveys for wading birds in managed wetlands annually.
- Conduct annual nesting survey of great blue heron colony.

Objective 1-9: Mammals – Continue to cooperate with the Southeastern Cooperative Wildlife Disease Study in studies of deer herd health once every five years. Continue cooperation with the red wolf recovery program.

Discussion: Forty-two species of mammals are known to occur on the refuge but only two are actively managed—the white-tailed deer and red wolf. The white-tailed deer population is currently at high levels. White-tailed deer are considered to be browsers because they primarily consume woody vegetation, but will eat almost any plant matter. Because of this adaptability, it is impossible to single out one habitat as greatly superior to others. However, best estimates suggest a much lower carrying capacity for pocosin habitat than other habitat types. Pocosin habitat is reported to support about six deer per-square-mile compared to about 18 deer per-square-mile along pocosin borders and 35-40 deer per-square-mile for coastal bottomland hardwoods.

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

Strategies:

- Conduct herd health checks on white-tailed deer every five years in cooperation with Southeastern Wildlife Disease Study Group.
- Continue to collect harvest data on all deer for permitted deer hunt annually.

- Conduct deer population estimate annually, determine optimum deer population size and means to manage at optimum levels.

- Cooperate with the Red Wolf Recovery Program by providing facilities, equipment, staff, and logistical support as requested.

- Note unusual mammal observations by the staff and the public.

- Assist cooperating agencies and universities with studies as needed.

- Prior to each annual refuge deer hunt, communicate with NCWRC regarding local disease issues as well as NCWRC surveillance or other information needs.

- Coordinate with NCWRC regarding collection protocol for deer harvested on the refuge so refuge deer data can be compared to other data collected in the state.

Objective 1-10: Reptiles and Amphibians – Continue to assist partners with studies of reptiles and amphibians.

Discussion: Mattamuskeet NWR reports 61 species of reptiles and amphibians. They are most abundant and diverse around permanent and semipermanent open water, marshes, creeks, lakes, and canals. They also thrive in disturbed or modified and transitional areas. Four venomous snake species have been documented on the refuge: the cottonmouth moccasin, canebrake (timber) rattlesnake, pygmy rattlesnake, and copperhead. The refuge is near the northern edge of the American alligator's natural range in North America. This formerly threatened reptile is found in marshes, slow-moving streams, and man-made canals. Alligators prefer areas where water turbidity is low, water quality is high, and an adequate food source is present. The refuge's canals and drainage ditches provide good alligator habitat.

Strategies:

- Monitor and manage refuge resources to protect federal and state-listed reptile and amphibian species.

- Assist cooperating agencies and universities with studies as needed.

- Increase law enforcement efforts to address the illegal harvest of reptiles and amphibians on the refuge.

HABITAT MANAGEMENT

Goal 2: Protect and enhance terrestrial, wetland, and aquatic habitats associated with the Lake Mattamuskeet environment in the context of climate change and rising sea levels.

Lake Mattamuskeet is by far the dominant habitat feature on the refuge, and is crucially important to wintering waterfowl and an array of other wildlife species. However, the lake is surrounded by marsh, bottomland forest, managed wetlands, and croplands, all of which contribute to the lake's and refuge's value to wildlife. The refuge will actively manage some of these habitats and more passively manage the others.

Objective 2-1: Open Water Habitat – Maintain 40,276 acres as open water habitat in Lake Mattamuskeet and associated canals. In addition, cooperate with the North Carolina Department of Environment and Natural Resources (NCDENR) to develop and implement a submerged aquatic vegetation (SAV) monitoring program for the lake.

Discussion: The CCP improves on the current management by providing for regular monitoring of salinity and water levels and the identification of the need for other studies, such as monitoring of SAV in the lake and potential effects of climate change and sea level rise. Lake Mattamuskeet provides much more than habitat for wintering waterfowl. The water level in the lake controls the ability of neighboring landowners to drain their land. The flapgates in the water control structures are designed to open when the water levels in the lake are higher than the water levels in the outlet canals and close when the outlet canals are higher than the lake. The outlet canals are the only means to remove water from the lake. Canal maintenance is thus critical to manage lake levels. Periodic removal of silt from the canals also reduces the deposition of silt in the lake. The lake is also the site of most of the public use (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) on the refuge. It is the centerpiece of the national wildlife refuge.

Strategies:

- Collect weekly salinity readings and record weekly lake water levels annually.
- Maintain two automatic water level loggers.
- Conduct annual vegetation surveys lake-wide, including SAV, with NCDENR. Consider past SAV survey data and monitoring sites in design of any new surveys.
- Maintain flapgates on outlet canals.
- Remove silt from outlet and rim canals and maintain a minimum depth of 5 feet in the mid-channel of the canals.
- Identify needed studies and pursue funding to initiate.
- Assist cooperating agencies and universities with studies as needed.
- Collaborate with the U.S. Geological Survey (USGS) to develop a program to monitor for the effects of sea level rise.

Objective 2-2: Freshwater Marsh (fringe around lakeshore) – Maintain approximately 2,300 acres of freshwater marsh on the refuge and continue to control common reed (*Phragmites*) and conduct prescribed burns periodically.

Discussion: The CCP continues current management. The freshwater marsh includes 900 acres of common reed (*Phragmites australis*) and 500 acres of marsh dominated by shrubs. Proper management will maintain all marsh acreage in native herbaceous vegetation, which provides the greatest benefit to native wildlife.

Strategies:

- Annually review treatment needs to control common reed and apply as necessary. Treatments may include herbicides, mowing, burning, discing, and flooding or a combination of these treatments.

- Annually review prescribed fire needs and apply prescribed fire in accordance with the refuge's Fire Management Plan.

- Monitor effects of phragmites treatments and prescribed fire to determine effectiveness and continually explore new methods to achieve goals, particularly methods that reduce herbicide use.

Objective 2-3: Managed Wetlands – Maintain approximately 2,500 acres of the refuge in 15 moist soil units and semipermanent forested wetlands.

Discussion: The CCP improves on current management by managing for mudflat habitat for shorebirds, increasing control efforts of common reed and alligatorweed, and replacing pumps and water control structures. These managed wetlands will provide greater wildlife benefits, particularly for waterfowl, shorebirds, wading birds and marsh birds.

Strategies:

- Manage impoundments for migratory birds.

- Manage to produce submerged aquatic vegetation, native emergent annual seed-producing vegetation, and mudflats.

- Conduct annual vegetation transects for all moist soil impoundments so the effectiveness of management actions can be evaluated and management needs documented.

- Monitor water levels weekly.

- Aggressively control common reed and alligatorweed annually and strive to keep acreage of these noxious weeds under 200 acres.

- Maintain, and rehabilitate as necessary, existing pump stations, water control structures, internal and external canals, and levees to manage impoundment water levels efficiently.

- Solicit assistance from the NCWRC, Ducks Unlimited, and others as necessary to ensure that impoundment infrastructure is properly maintained.

- Assist cooperating agencies and universities with studies as needed.

- Annually prepare a detailed water management plan which outlines timing of drawdowns and other treatments, utilizing data collected from annual vegetation surveys and waterfowl surveys. Plan should also outline a 5-year schedule to coordinate drawdown of the impoundments such that habitat needs for a variety of waterfowl, wading birds, shorebirds, and other water birds are available annually.

Objective 2-4: Forested Habitats – Maintain existing areas of mixed-pine hardwood (1,300 acres), wet pine flatwoods (1,000 acres), and cypress gum swamp (266 acres nonimpounded, 572 acres impounded). In addition, investigate desirability and feasibility of restoring Salyer's Ridge pinewoods.

Discussion: Bottomland hardwood forest habitat on the refuge exists as small pockets of hardwood trees (tree species consisting of red maple, water oak, willow oak, swamp cottonwood, and sweetgum) associated with wet pine flatwoods and mixed loblolly pine/hardwoods. These "pockets" of hardwood trees occur on levee spoil banks and on mineral soil flats. Some opportunity exists to expand these hardwood stands (50–150 acres) by plantings (water, willow, swamp chestnut oaks, and green ash) and removal of overstory (cypress, sweetgum) trees to allow for light penetration to the forest floor. The lake dynamics (i.e. frequent flooding of soils within 300 feet of the lake shore and competition from more flood tolerant tree species hinders hardwood tree establishment. Cypress-gum swamps are important habitat for cavity nesting wildlife species. Water tupelo trees are important nectar sources for bees.

The CCP improves on current management by providing for active forest management in wet pine flatwoods and mixed pine hardwoods to manipulate canopy coverage and promote understory development. The CCP also provides for active forest management to manipulate canopy coverage and promote understory development.

Strategies:

- Patrol cypress-gum swamp to prevent vandalism and timber theft.
- Explore the value of occasional prescribed burning and other forest management practices in wet-pine flatwoods and mixed-pine hardwoods and enact management practices if necessary to support trust species in wet-pine flatwoods and mixed-pine hardwoods.
- Investigate ways to improve the value of cypress-gum impoundments for waterfowl and other trust species.
- Cooperate with North Carolina Forest Service and Alligator River NWR staff to monitor and treat southern pine beetle activity in wet-pine flatwoods and mixed-pine hardwoods.
- Cooperate with the National Park Service in monitoring the Salyer's Ridge National Natural Landmark.

Objective 2-5: Cropland – Maintain 191 acres of cropland in corn and soybeans. Also, investigate other options for cropping and/or early successional habitat and future use of CRP cropland.

Discussion: The CCP maintains a minimum acreage of cropland. The refuge cropland provides grain that furnishes high-energy food for wintering waterfowl to restore reserves lost during their migration south and to build reserves for their migration north.

Strategies:

- Conduct farming in accordance with best management practices.
- Study methods to increase utilization of cropland area by waterfowl and decrease management costs.
- Increase control of brush along edges of field ditches to increase use of fields by waterfowl.
- Clean out silt from field drainage ditches to improve drainage and thus permit more efficient farming and improved yields.
- When the contract on the cropland in the CRP (189 acres) expires in 2011, seriously consider not renewing the contract. This will allow more management options on the tract but will also likely reduce the refuge rent share on the farmed cropland from 50 percent to 25 percent. After contract expiration, consider actively farming some of the CRP cropland to replace crops lost due to new cooperator agreement.

RESOURCE PROTECTION

Goal 3: Protect refuge resources by limiting negative impacts of human activity and invasive species on and around the Mattamuskeet NWR.

Resource protection entails a broad range of activities that all aim to protect habitat, wildlife populations, and cultural resources from a variety of potential threats to their quality and quantity. Land protection refers to obtaining an interest in land—and the resources on it—that can be either some form of conservation easement up to fee simple title. Given the prominence of water resources to the refuge's identity and purposes, it is crucial to protect water quality and minimize contaminants that can impair it and harm wildlife and people. As a federal land management agency, the Service is required by law to preserve cultural resources; the area contains many known historic resources and properties. Effective law enforcement is indispensable on the refuge. Controlling invasive plants and animals is necessary to protect the integrity of native ecosystems and indigenous plant and animal communities.

Objective 3-1: Land Protection – Maintain the existing refuge size of 50,180 acres. Explore opportunities for minor purchases of road easements, canal access, etc.

Discussion: The Service has acquired all of the land within the refuge's approved acquisition boundary. The boundary did not extend to any roads, limiting access to the refuge by the public and the staff. There is also a trend towards the development of land adjacent to Lake Mattamuskeet that is not well suited to septic tanks. An expanded acquisition boundary will give the Service the opportunity to acquire land to improve access and ensure water quality.

Strategies:

- Develop a minor expansion proposal, less than 10 percent of the refuge, to acquire acreage needed to improve management and public access.

- Explore the possibility of purchasing an access right-of-way from the North Lake Road to the MI-11 Impoundment to provide public boat access to the northeastern part of Lake Mattamuskeet and Jarvis Canal, and more efficient management access to the MI-11 pump station and water control structure.

- Explore the possibility of purchasing one acre of private land adjacent to the Rose Bay Boat ramp to provide proper parking for trucks with boat trailers.

- Discuss with appropriate landowners the refuge's interest in purchasing key properties adjacent to the existing refuge acquisition boundary that fulfill aims of either improving access or ensuring refuge's water quality.

- Work closely with the Service's Division of Realty, Southeast Regional Office, to acquire properties of interest if they become available.

- Work with landowners to purchase by full fee title all road rights-of-way which are currently covered by easements and leases—primarily access to Rose Bay boat ramp and the Lake Landing Area.

- Participate in any regional or state meetings concerning the establishment of water laws to ensure the refuge receives appropriate control of water on the refuge and in Lake Mattamuskeet and thus secure water necessary for the annual needs of fish and wildlife.

Objective 3-2: Water Quality and Contaminants – The NCWRC continues to monitor 14 sites once annually for a limited number of water quality parameters. In addition, cooperate with NCDENR to develop and implement a long-term water quality management plan for the lake.

Discussion: To fulfill the purposes of the refuge, it is crucial to maintain the water quality of Lake Mattamuskeet and monitor environmental contaminants that may compromise it or potentially harm wildlife or consumers of fish. Managing the lake's salinity is important to maintaining its SAV and fish populations. Mercury contamination of fish flesh is a growing concern to anglers and state public health regulators around the country, as awareness grows of the widespread extent of mercury deposition and methyl mercury's potential impacts on wildlife and human health. Mercury is also negatively impacting osprey and may be negatively affecting many other fish-eating species, including otter and cormorants.

Strategies:

- Implement portions of the water quality monitoring plan as staffing levels allow.

- Monitor salinity in Lake Mattamuskeet weekly.

- Monitor specific conductivity during vegetation survey of lake as staffing levels allow.

- Monitor mercury levels in the lake ecosystem and higher tropic levels of the food web (osprey, largemouth bass) every five years.

- Encourage the limited water quality monitoring conducted by university and state agencies.

- The water quality management plan will identify those water quality parameters of concern that warrant periodic monitoring. The plan will also identify related media that warrant sampling for concentrations of likely contaminants/toxins, including sediments, fish and bird tissues.

Objective 3-3: Cultural Resources – In cooperation with RHPO and SHPO, continue to comply with Section 106 of the National Historic Preservation Act. In addition, within 15 years of CCP approval, prepare and begin to implement a Cultural Resources Management Plan.

Discussion: The CCP intensifies the current level of management. Section 106 of the National Historic Preservation Act mandates that the Service protect cultural resources on the refuge. There have been no comprehensive cultural resources studies of the refuge. The staff will refer all land disturbing activities to the Service's Regional Archaeologist. Mattamuskeet Lodge, recently transferred to the state, is the major landmark in Hyde County and is a source of pride of the county's residents. The refuge will continue to work with the state, county, and civic groups in the management of the lodge and its surroundings, which include the refuge's proposed offices, visitor contact stations, maintenance facilities, and staff housing.

Strategies:

- Cooperate with other agencies and organizations to protect Mattamuskeet Lodge and comply with the Historic Preservation Act.

- Conduct a complete cultural resource survey.

- Within 15 years of CCP approval, conduct a Phase I archaeological survey of the refuge, by qualified personnel, as a necessary first step in cultural resource management.

- Conduct a Phase II investigation if archaeological resources are identified during the Phase I survey. In this, the eligibility of identified resources for listing on the National Register of Historic Places (NRHP) is evaluated prior to any disturbance.

- Conduct a Phase III data recovery if resources identified in Phases I and II are determined to be eligible. This will recover data and mitigate adverse effects of any undertaking.

- Within 15 years of CCP approval, prepare a Cultural Resources Management Plan (CRMP) for the refuge.

- Follow procedures outlined in CRMP for consultation with RHPO, SHPO, and potentially interested American Indian tribes.

- Follow procedures detailed in CRMP for inadvertent discoveries of human remains.

- In compliance with Section 106, ensure that archaeological and cultural values are described, identified, and taken into consideration prior to implementing undertakings, primarily those actions or activities that entail excavation or substantial soil disturbance. Communicate closely with Service's Regional Historic Preservation Officer and with North Carolina's State Historic Preservation Office.

- Develop a step-down plan for surveying lands to identify archaeological resources and for developing a preservation program.

Objective 3-4: Law Enforcement – Dedicate one full-time equivalent (FTE) law enforcement officer to the Mattamuskeet NWR Complex. In addition, the refuge will serve as a new officer field training station.

Discussion: The CCP increases the capacity of the Service to deter crime, protect public safety, safeguard natural and cultural resources, and prosecute violations. The current lone law enforcement officer is responsible for four refuges: Mattamuskeet, Swanquarter, Cedar Island, and Pocosin Lakes, covering approximately 200,000 acres in five counties. As public use increases on these refuges, the same level of patrol will result in a smaller percentage of violations being cited.

Strategies:

- Remove the responsibility of law enforcement at Pocosin Lakes NWR (115,000-acre refuge) so the current officer can concentrate law enforcement efforts at the remaining refuges.

- 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 100 violations annually.

- Monitor activities on land adjacent to the refuge associated with endangered species and migratory birds.

- Post signs in high litter areas stating that "Wildlife Comes First; Littering is Harmful to Wildlife; If Littering Continues, this Area will be Closed to the Public;" then, if it becomes necessary, close the area and post the sign.

- Include information on the sign about who to contact to report violations.

- Provide visible law enforcement presence on the refuge.

- Identify safety hazards and ensure the safety of visitors by eliminating hazards; and controlling access into hazardous areas.

- Ensure that applicable refuge-specific regulations are in brochures and signs.

Objective 3-5: Invasive Plants – Continue to annually control approximately 300–500 acres of common reed (*Phragmites*) along edge of Lake Mattamuskeet and the moist soil impoundments and 50 acres of alligatorweed in canals and moist soil impoundments.

Discussion: The CCP increases the acreage of invasive plant pests controlled above the current level of management. Invasive plants, particularly common reed, are a threat to the natural vegetative communities on the refuge. Pest plants are present in marshes, managed wetlands, and forests, and on public use trails, ditch banks, and road shoulders. The refuge staff is currently managing common reed with herbicides and other management practices and pest plants on roadsides with mowing. Alligatorweed can be mowed, but is difficult to eliminate because it will propagate from stem fragments or the roots; there is no available biological control for this invasive plant.

Strategies:

- Develop an Integrated Pest Management Plan.

- Continue to treat common reed-infested areas with EPA- and Service-approved herbicides such as glyphosate. Also explore other management practices, such as mowing, burning, discing, flooding, or combinations of these, to increase the effectiveness of control and/or reduce the use of herbicides.

- Provide additional environmental protection by the proper timing of application and the selection of conservative application equipment.

- Take advantage of common reed's poor ability to invade vegetated soils by minimizing disturbance and quickly vegetating sites which have been disturbed. This can be achieved by seeding, plantings, or management to encourage rapid establishment of preferred native vegetation.

- Apply herbicide in the late summer, at which time common reed is still growing but most wetland plant species are dormant. Herbicide applications at this time kill *Phragmites* but do not significantly affect adjacent or underlying desirable species.

- Explore chemical options for alligatorweed control and implement one or more of them using adaptive management. Active ingredients that have been successful in treating alligatorweed include 2,4-D, glyphosate, triclopyr, fluridone, and imazapyr. These active ingredients are found in the products Navigate and Aqua-Kleen (2,4-D); Rodeo, Aquamaster, Eraser AQ, Touchdown Pro, AquaNeat (glyphosate); Renovate (triclopyr), Sonar and Avast (fluridone), and Habitat (imazapyr).

Objective 3-6: Invasive Animals – Work with USDA APHIS wildlife services (damage control) and other partners to implement a nutria control program.

Discussion: The CCP improves on the current level of management by specifying monitoring at a certain frequency and providing for the evaluation of the impacts of resident waterfowl. At present, the nonnative nutria is the most pressing problem. It is abundant on the refuge and can be destructive to levees and vegetation. Currently, nutria are controlled opportunistically by staff.

Strategies:

- Develop a Nuisance and Exotic Animal Control Plan.
- Cooperate with the State Health Department to monitor for mosquito borne diseases.
- Evaluate impacts of resident waterfowl (Canada geese and mallards) and implement control measures as needed.
- Contact APHIS and review alternative nutria control options with them. These may include hunting or trapping by trained professionals, as well as allowing the public to take nutria during hunting season.
- Initiate studies in cooperation with universities and the NCWRC to improve the understanding of the impacts of nutria to aquatic vegetation and native wildlife, particularly waterfowl.
- Consider provisions to allow public hunting of feral swine if feral swine become established on the refuge. Consider hunting impacts to other public uses and wintering waterfowl when evaluating a feral swine hunt program.

VISITOR SERVICES

Goal 4: Develop programs and facilities to provide public use opportunities to include hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation if they are compatible with refuge purposes.

Mattamuskeet NWR contributes to the rich variety of outdoor recreation experiences available in coastal North Carolina. The refuge accommodates each of the priority wildlife-dependent public uses as identified in the Improvement Act. This includes hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. Due to Lake Mattamuskeet's shallow depth and the potential for disturbing wildlife, airboats, sailboats, jet skis, and sailboards (for wind surfing) are all prohibited on the lake. These activities are not considered wildlife-dependent.

Objective 4-1: Visitor Management – Within five years of CCP approval, complete preparation of and begin to implement a visitor services' step-down management plan. Within three years of CCP approval, provide additional signage to help welcome and orient visitors.

Discussion: The refuge does not have an up-to-date visitor services; plan; the last Public Use Plan was completed in 1988. The Fishing Plan was completed in 1989. The Hunting Plan was completed in 1988. These plans have been reviewed annually to meet the Service's notification requirements. Prior to this CCP, given the limited time and funding to manage visitor services and outreach, refuge personnel have provided a range of opportunities and programs for the visitor.

Messages and information relating to refuge issues (transfer of lodge, habitat management) are outdated in the Public Use Plan and revisions are needed. Revisions are needed in the Visitor Services Plan to indicate what media or method will be used to convey these messages to the public. Current and future staffing needs for implementation of the visitor services' program are identified and listed in budget data bases. The Visitor Services Plan should be comprehensive

and cover all aspects of the visitor services program, including fee programs, universal accessibility, use of concessions, guides, Cooperating Association MOUs, etc.

Signage includes entrance signs, directional signs on and off the refuge, boundary-marking signs, and regulatory information signs. The refuge boundary is not adequately signed. Approximately 60 percent of the refuge boundary, particularly the north section of boundary in Lake Mattamuskeet, needs to be resurveyed and signed. Main entrances to the refuge are generally well-signed, but some of the smaller entrances are unsigned. Additional directional signage with mileage information is needed off the refuge. At the headquarters, there are signs in various locations that direct visitors to East Canal Road, the hiking trail, and the boat launch. As part of the sign plan, these signs should all be combined into one set of signs with the various destinations listed.

The refuge's regulatory information is provided in its general, hunting, and fishing brochures. At the Rose Bay and Lake Landing recreational areas and at the entrance to the headquarters, there are signs that tell visitors some of what is permitted or prohibited. The refuge also includes several kiosks: one at the entrance to the headquarters area, a trailhead kiosk at the entrance to New Holland Trail, and a "Kuralt Trail" kiosk for the lake observation deck along the Highway 94 causeway.

Parking is allowed on both sides of Highway 94. There is a gravel parking area at the headquarters and at the Rose Bay Canal and Lake Landing Canal areas. There is an accessible spot at the Central Canal boat launch. None of the other parking areas have accessible parking spots.

The refuge has several brochures, all of which are produced per the Service's graphic standards. The general brochure welcomes visitors and provides basic refuge information, regulations, and a map of the public use area. The refuge also has hunting and fishing brochures and a wildlife/bird list. There is a small visitor contact area in the office, with a glass display case and some additional taxidermy mounts. Brochures are available to the public and displayed in a brochure rack, and local natural history literature is for sale.

Strategies:

Visitor Services Plan

- Develop an updated site plan for the new office site that includes all public use opportunities/facilities for the headquarters area and the entrance to the area. It should address vehicular and pedestrian circulation, signs, parking, etc.

- Focus efforts on facilities and programs near the Entrance Road, Wildlife Drive, new office, East/Central/West Canals.)

- Work with regional sign coordinator to develop a Sign Plan for the refuge that follows the Service sign standards.

- The management agreement with the state should state that for all programs and activities that include refuge topics/information, the refuge manager will have final approval of this information.

- Ensure that staff and contractors developing the Visitor Services' Plan are familiar with Part 605 of the Wildlife-Dependent Recreation and Visitor Services' Requirements' Handbook.

- Messages for all visitor services programs should include:
  a) Mission of the FWS and NWRS
  b) Purposes of the refuge
  c) "Wildlife First"
  d) Value of the refuge for waterfowl; percentage of coastal populations of various waterfowl that are at Mattamuskeet NWR; the depth of the lake makes it critical to waterfowl; how the refuge manages for the benefit of waterfowl (impoundments)
  e) Partnership with the State of North Carolina

Figure 5 shows the visitor use facilities on the refuge.

Directional signs

- Work with partners and decide how to address signage related to the Headquarters/Lodge partnership.

- Work with the North Carolina Department of Transportation to place additional directional signs for the refuge at decision points driving in from Engelhard, Columbia/Fairfield, and Washington/New Holland; include mileage information on the directional signs.

- Install turn signs on Highway 264 at Lake Landing and Rose Bay areas.

- Install directional signs at the decision points on the walking trails (levees) at Lake Landing and Rose Bay areas.

Kiosks/information panels

- Place a 3-panel (after-hours) kiosk at the headquarters area and focus the 6-panel Entrance Road kiosk on interpretation of refuge information. Site the 3-panel kiosk so it is visible from the lodge parking area. Information should include:
  a) Rules and regulations (include explanation of the various signs on the refuge)
  b) Recreational opportunities

- Place information kiosks at parking lots of Lake Landing area and Rose Bay area on:
  a) Mattamuskeet NWR
  b) Do's and Don'ts

Roads/Parking

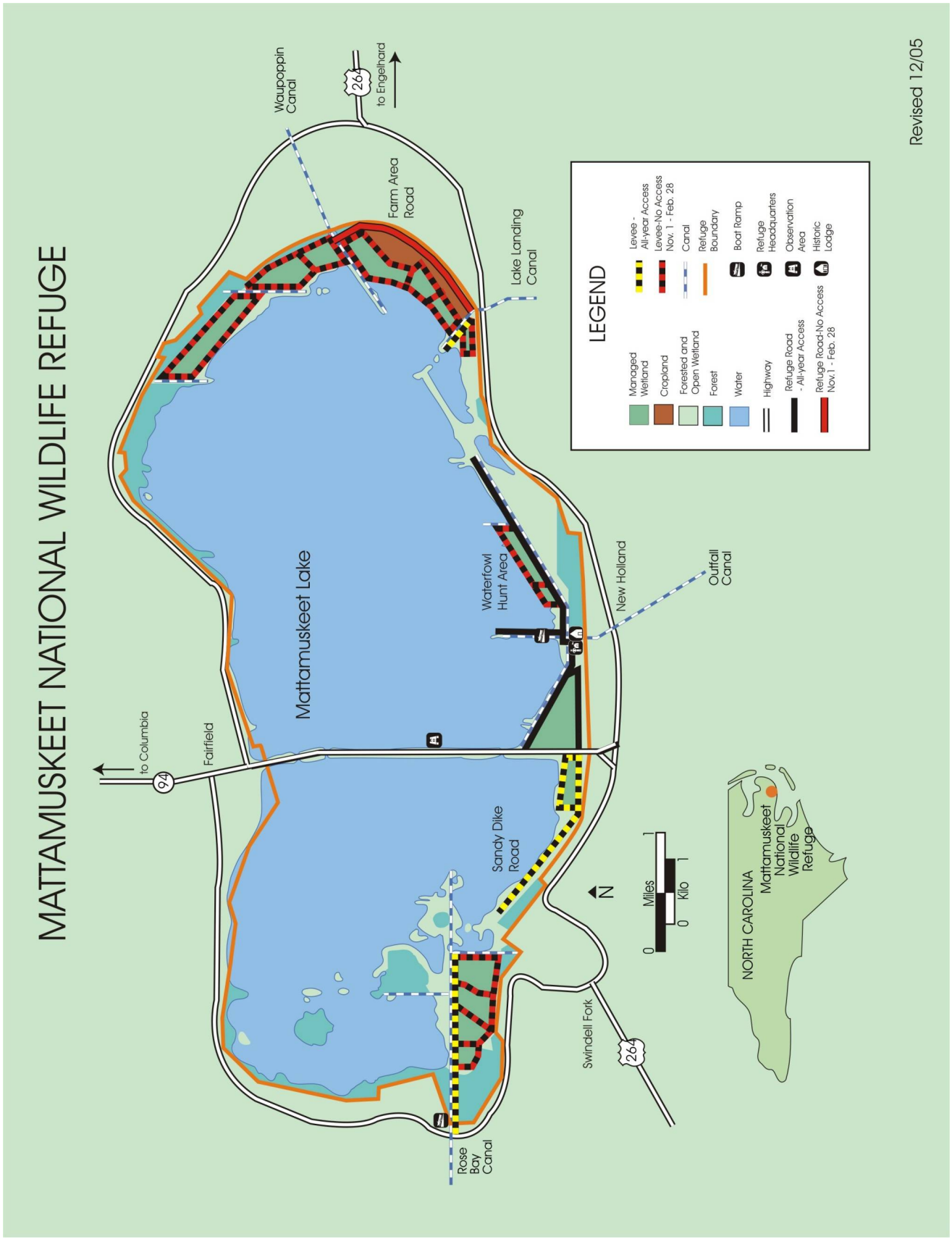
- In-site plan address vehicle and pedestrian circulation in headquarters area.

- Install an electronic gate, timed to close at the end of the day, on the Entrance Road at the boundary line between the refuge and the NCWRC lodge property to prevent unauthorized refuge entry after dark by lodge visitors. Also establish a dense tree and shrub planting of native species on each side of the gate to prevent vehicles from driving around the gate.

- Move the gate on East Canal Road to the west side of the Central Canal Bridge to allow the public to use the New Holland Boardwalk during refuge waterfowl hunts.

- Purchase one acre of private property adjacent to Rose Bay Boat Ramp to provide adequate parking for trucks with boat trailers.

Figure 5. Visitor service facilities on Mattamuskeet National Wildlife Refuge.



- Use dust abatement materials to reduce dust problem on Entrance Road.

- Correctly sign the accessible parking spot at the Central Canal boat launch.

- Explore pros and cons of paving the entrance road.

- Develop pull-offs on entrance road to allow visitors to safely stop and observe wildlife without blocking the road.

- Develop accessible parking sites at:
  a) Highway 94 Observation Deck (*Intermediate)*
  b) Highway 94 Fishing Decks (*Intermediate – Long term*)
  c) Rose Bay area parking *(Intermediate)*
  d) Lake Landing area parking *(Intermediate)*
  e) Central Canal Road accessible hunting blind *(Now)*

Trails/Boardwalks/Viewing Platforms

- Construct trail and boardwalk system at east end of East Main Canal Road to exhibit Fisher Slough and East Main Canal habitats and wildlife.

- Construct two pull-offs and one viewing platform on new wildlife drive and one viewing platform on Entrance Road to help display wildlife in the Entrance Road Impoundment. Also, construct shallow viewing ponds in front of pull-off sites and use excavated material to create pulloffs.

General Brochure

- Work with the Service's Regional Office of External Affairs to update the general brochure and tear sheet. Changes to consider:
  a) Include information about recreational opportunities.
  b) Refocus the message to purpose of the refuge and waterfowl management.
  c) Include a new site map in the updated brochure (include distances to key public use areas on the map.)
  d) Symbols and color scheme in the site map need to be revised to be less confusing.

Visitor Contact

- Develop a small exhibit area in the lobby of the new office (include components that would be interesting to children.)

- In new headquarters, consider access to restrooms for after hours (include time locks).

Boundary

- Resurvey and re-sign sections of the north boundary in Lake Mattamuskeet, as well as the eastern half of the refuge where boundary is unclear.

Objective 4-2: Hunting – Increase hunting opportunities for deer and waterfowl. Cooperate with NCWRC to conduct activities promoting hunter education, recruitment, and retention.

Discussion: Mattamuskeet NWR is open to hunting of waterfowl and white-tailed deer in accordance with applicable state and federal regulations. Permits are required to hunt on the refuge. Deer hunting consists of two two-day paired hunts in October. The refuge issues

permits to 150 applicants by lottery for each two-day hunt. The entire refuge is open for the deer hunt except for a 600-acre area, which includes the Entrance Road, MI-4 impoundment, and the Headquarters. Hunters may take one antlered and one antlerless or two antlerless deer per day on Mattamuskeet NWR. Deer may only be taken with shotgun, muzzleloading rifle/shotgun, or bow and arrow. All deer taken on Mattamuskeet NWR are checked at the Deer Check Station at refuge headquarters. Weights and other biological information are collected by the refuge.

Waterfowl hunting is authorized on approximately 1,000 acres of open water and marsh on the south side of Lake Mattamuskeet. The waterfowl hunt dates are scheduled as two half-day paired hunts on the mornings of Tuesday, Wednesday, and Friday; Saturday from mid-December through January. The application process is managed by the NCWRC. There are 16 hunt blinds available; each blind holds three people and has a dog platform. One of the blinds is accessible by individuals with mobility disabilities.

Waterfowl may only be taken with shotguns, using approved nontoxic shot. Access to the hunt area is by vehicle on East Canal Drive and then via foot or nonmotorized boat. All waterfowl taken are checked at a check station at refuge headquarters prior to hunters leaving the refuge. There is a 30-shell limit per hunter per day. The use of retrieving dogs is permitted, but dogs must be under voice command at all times.

Under this CCP, the refuge will explore ways to increase hunting opportunities for deer and waterfowl, especially for youths, as well as continue to provide annual hunts for deer on 6,000 acres, for waterfowl on 1,000 acres (including youth), and resident Canada geese.

Strategies:

- Support Refuge System proposal to increase fees to $15.
- Contact “Capable Partners” or Wheelin Sportsmen (or others) and work with them to improve the accessible hunting blind and to also provide additional accessible hunting opportunities.
- Explore the possibility of making more of the waterfowl hunting blinds accessible. Communicate with the North Carolina Handicap Sportsmen Association to facilitate this.
- Update the hunting brochure as necessary and also ensure that hunting information on the refuge website is timely and accurate.
- Continue to provide waterfowl hunting opportunities in permitted hunts on 1,000 acres for 1,000 hunter days in 16 blinds annually.
- Continue to conduct a two-day youth waterfowl hunt.
- Explore feasibility of moving refuge hunt blinds to reduce disturbance between hunting groups.
- Continue to provide deer hunting opportunities in permitted hunts on 6,000 acres for 600 hunter days annually.

- Consider adding another two-day deer hunt in October, for a total of three paired hunts.

- Consider prioritization for one or all of the hunts for permit allocation to those hunters who harvest the most does, if the deer herd is too high, and demand for permits exceeds availability.

- Strive to change the buck:doe ratio of harvested deer from the current 2 to 3 males per 1 to 3 females to a healthier 1 to 3 males per 2 to 3 females.

- Continue to provide September Canada geese (nonmigratory geese) hunting season opportunities on 45,000 acres.

- Explore the value of increasing the number of permits for the September Canada geese hunt, which is currently limited to 100 permits.

- Explore the value of increasing waterfowl hunting opportunities by participating in the early season waterfowl hunts, as well as the late season youth hunt.

- Cooperate with NCWRC on enforcement of hunting regulations annually and explore and support ways to promote hunter education, recruitment, and retention, particularly among youths.

- Explore the merits of initiating a bow hunting season for white-tailed deer.

- Explore the possibility of managing the four outlet canal structures with stoplogs to prevent lake water levels, during drought years, from dropping to levels that force the cancellation of the refuge general waterfowl hunt. A Memorandum of Agreement with the Hyde County Soil and Water Conservation District, Natural Resource Conservation Service, and possibly other agencies to facilitate a water management plan should also be explored.

Objective 4-3: Fishing – Increase fishing opportunities (e.g., add one boat ramp) to support 25,000 angler visits annually.

Discussion: Lake Mattamuskeet supports largemouth bass, striped bass, catfish, sunfish, crappie, white perch, and blue crabs, and is popular for fishing, crabbing, and canoeing. Sport fishing for largemouth bass, crappie, catfish, bream, and other species is popular on the lake. Bow fishing for carp and other rough-fish is permitted during the fishing season. Recreational "crabbing" for blue crabs is allowed on the lake, and is a popular activity on and around the refuge's canals and water control structures. Boat access is allowed on the lake from March 1 to November 1. While outboard motors are allowed on the refuge, the shallow lake depth limits their use. The lake and all other waters on the refuge are closed to boating during winter months to provide sanctuary for wintering waterfowl.

The refuge manages and promotes quality and safe fishing experiences. There are limited accommodations for anglers with disabilities. The number of anglers on the refuge is unknown. Conflicts are addressed by the refuge's law enforcement officer. Special fishing permits are issued for fishing tournaments on the refuge. Local, state or tribal agencies are consulted within the development and ongoing management of the fishing program. Fishing information records are not kept, such as species and numbers taken, or the number of local versus out-of-state anglers.

There are concerns about water quality and canal/water control maintenance impacting the fisheries or fishing opportunities. A refuge law enforcement officer, who covers four refuges, enforces fishing and boating laws and regulations. However, current staffing is inadequate to manage the fishing program and additional law enforcement is needed. Clear directional signs direct anglers to the fishing areas in most locations. Regulatory signs are needed to reduce littering from bank fishermen and to indicate refuge-specific regulations.

The refuge has a Fishing Plan written and last reviewed in 1989, but it does not conform to the current format for such plans in the *Fish and Wildlife Service Manual.* The Refuge Fishing Plan will be updated after the CCP is completed and implemented.

Strategies:

- At the Central Canal boat launch, install a bumper rail on the pier to make it safe for fishermen in wheelchairs.
- Update the fishing information on the website at least once a year.
- Post health and fish consumption safety warnings at boat launches and fishing areas.
- At the boat launches, change the sign that currently reads "No Boating and Fishing …" to "No Boating." Also make sure wording is consistent regarding when areas are closed.
- Re-publish and update the fishing brochure. Include special crabbing regulations and other special conditions (e.g., bow fishing, night fishing), and update annually.
- Replace the boat launch at the Rose Bay area. Also purchase one acre of adjacent private property and construct a parking area for trucks with boat trailers.
- Modify access to the Highway 94 fishing decks to make them accessible to people with disabilities.
- Maintain two existing boat ramps annually.
- Rehabilitate Lake Landing bridges which are used for fishing and crabbing.
- Install walkway on north side of Entrance Road bridge to provide safer and improved fishing access to West Main Canal.
- Replace bridge on Central Canal with a higher bridge which will allow boats to go under it. Also install walkways on bridge for safer fishing and crabbing.
- Provide boat access to northeast side of lake, at or in the vicinity of Jarvis Canal.
- Host one fishing tournament for 100 anglers annually and one bow fishing tournament for 100 bow fishers annually.
- Cooperate with NCWRC on enforcement of fishing and boating regulations annually.

- Maintain two lake/canal fishing piers.
- In cooperation with NCWRC, initiate creel census survey and conduct every 5 years, as well as other studies, to improve management of the sport fishery.

Objective 4-4: Environmental Education – Continue to host Environmental Field Day, environmental educator workshops, and university student activities. In addition, reinstitute Nature Week and begin to host K-12 school programs (10 annually).

Discussion: Mattamuskeet NWR does not have a visitor services' park ranger position. Visitor services' functions and responsibilities, including environmental education and outreach and volunteer coordination, are divided among the refuge manager and deputy refuge manager.

The Mattamuskeet NWR community has one school which serves elementary, middle, and high school students. The school is located in close proximity to the refuge; however, due to limited staff, refuge managers have been unable to accommodate classroom speaking requests. However, the refuge manager and deputy refuge manager do presently attempt to meet all refuge tour requests from high schools and college groups, at a rate averaging less than one per month.

In a management agreement with the State of North Carolina in 2006, the Service conveyed the historic Mattamuskeet Lodge and Mattamuskeet NWR headquarters to the state. The NCWRC will be the state agency responsible for the management of the lodge, and thus, for the natural, historical, and cultural interpretation of the lodge and surrounding cultural and natural resources.

In previous years, East Carolina University students utilized education classrooms and a laboratory which were located on the east side of the lodge. It is anticipated that the NCWRC will continue to provide these educational resources. The main area of the lodge will continue to provide exhibit space for refuge interpretive purposes. Partnership for the Sounds, a nonprofit group, will likely have an office at the lodge and will provide staff to operate a visitor information center and store.

Strategies:

- Develop a closer relationship with the local school.
- Conduct programs for local school groups as requested and as time permits.
- Contract to develop a teacher activity kit that emphasizes local natural history and the refuge for use in the classroom. Consider contracting with a local teacher or the East Carolina University.
- Develop an environmental education activity lesson that incorporates the New Holland Trail and or wildlife drive area. Include a defined outcome of the activity, including a brief discussion with a refuge employee. Consider contracting with a local teacher or East Carolina University.
- Make these afore-mentioned activities available on the Internet.
- After the above materials have been developed, partner with Alligator River NWR or East Carolina University to develop an annual teacher workshop.

- Expand the group of volunteers available to provide environmental education programs/tours on or off the refuge.

- Collaborate with NCWRC, the new owners of the lodge, to develop and support environmental education and interpretation activities, displays, brochures, and related initiatives which are featured as a part of the lodge.

- Annually, serve as host to and assist with a Nature Week sponsored by the Hyde County Extension Service and an Environmental Field Day sponsored by the Hyde County Soil and Water Conservation District.

Objective 4-5: Interpretation – Expand number of interpretation opportunities to approximately 15,000 by adding kiosks, annually revised brochures, and interpretive signage along wildlife drive and the New Holland boardwalk trail. Open and staff visitor contact station with volunteer(s) on weekends.

Discussion: Because the refuge does not have a visitor services' specialist on staff, there are few staff-led interpretive programs offered to the public. Interpretive opportunities include the availability of interpretive materials in the visitor contact area of the office, such as photographs, maps, and taxidermy mounts. There is a 6-panel kiosk at the entrance to the headquarters with information about the refuge and the Refuge System. At the observation point on Highway 94, there is a panel on the observation deck with information about waterfowl. At the parking area for the observation deck, there is a 3-panel kiosk with information about Mattamuskeet NWR and other refuges in the area that have been designated as part of the Kuralt Trail.

Strategies:

- Work with graphics contractor to update the information on the Kuralt Trail panels.

- Develop some interpretive/information panels on the back section of the wildlife drive.

- Develop a 5- to 10-minute refuge-specific video to be used in the headquarters lobby area. Use signs and exhibits to interpret the following topics for the refuge:
  a) Habitat management
  b) Refuge
  c) Refuge System (What is a National Wildlife Refuge?)
  d) USFWS
  e) Wildlife First
  f) Waterfowl
  g) Wildlife other than waterfowl
  h) Lake level and importance to the habitat
  i) Interdependence of lake life (include plants)
  j) Information about crabs, crabbing, and why the harvest is limited

- Consider placing interpretive signs in the following locations:
  a) The visitor contact area of the new headquarters
  b) The Entrance Road kiosk site
  c) At Lake Landing Area have interpretive panel about the impoundments and water management as part of habitat management
  d) At Rose Bay Parking or Sandy Dike Road area install a panel about fishing and the other priority uses and management for these uses

- Install a panel about swans and waterfowl at the Highway 94 observation deck or a four-sided revolving panel with information about the four seasons.

- Place interpretive panels along the New Holland Trail about the habitat and how it supports migratory songbirds, wood ducks, and other wildlife.

- Continue to conduct interpretive tours during the December Open House and one per week from November through February, and other times as appropriate. Consider two tours per week during the winter months if staff is available and the second tour of the week will not cause a large waterfowl concentration to be disturbed in the same area more than once a week.

- Continue to conduct youth hunter orientation associated with a two-day youth waterfowl hunt.

- Maintain two information kiosks to inform the public about the refuge and its resources.

- Maintain a visitor contact station with a brochure rack and wildlife exhibits in the refuge office.

- Revise one refuge brochure annually.

- Provide a visitor contact area with displays in a new office or a visitor center.

- Staff the visitor contact area on weekends with volunteers or work campers.

Objective 4-6: Wildlife Observation and Photography – Continue to provide about 90,000 viewing and photography opportunities annually by maintaining boardwalk, fishing piers, observation decks, photo blind, and wildlife drive. In addition, reinstall eight-mile canoe and kayak loop trail and construct one photo-blind.

Discussion: The refuge has changed the location of the wildlife drive with the proposed option of opening a new drive closer to the headquarters. The new drive is approximately 1.5 miles in length and provides viewing access to wetlands managed by the refuge. The previous wildlife drive also provides access to the duck hunting blinds and is closed to the rest of the public when in use by hunters. The relocation of this drive provided year-round access. The wildlife drive will eventually provide pull-offs and overlooks for the public to use for wildlife observation and wildlife photography.

The previous wildlife drive was renamed East Canal Road. East Canal Road provides access to the New Holland Boardwalk Trail and the photo blind. The trailhead provides a kiosk with a map of the trail and other information. The trail has benches for visitors to use during wildlife observation and wildlife photography.

The Rose Bay Area is accessible via hiking trails year-round. The trail is three miles long one way, ending at a viewing area of the lake. This location offers a solitary experience with good wildlife viewing and photography opportunities along the canal and the lake. Lake Landing Area offers hiking access from March 1 to November 1. This area also provides several miles of hiking trails with opportunities for wildlife observation and wildlife photography.

The refuge photo blind is open on a first-come basis with a sign post displaying if the blind is currently in use. The blind is well-constructed, offering concealment and appropriate openings for photographing wildlife.

There is a wildlife observation area off Highway 94. The observation area is constructed over the lake with an elevated boardwalk leading the visitors to the observation platform. The platform is equipped with a viewing scope designed for use by both children and adults. The boardwalk has a gentle grade, making it accessible to individuals with disabilities; however, the parking area has no accessible parking spaces or concrete sidewalk to the boardwalk. There is a kiosk providing orientation and interpretation.

The current refuge wildlife/bird list was last updated in 2007. The refuge general brochure, updated in 1998, provides a general map of the entire refuge, which shows approximate locations for the wildlife drive, observation area, and various trails (levees). The map will need to be improved in the future to accurately depict the location of the New Holland Trail, fishing piers, trails on levees, photo blind, new headquarters, and new wildlife drive.

Strategies:

Entrance Road

- Construct a wildlife viewing platform at the current visitor pull-off on the Entrance Road. Also install interpretive panels and a spotting scope.

- Consider paving or otherwise surfacing Entrance Road to reduce dust levels.

Wildlife Drive

- Construct a new wildlife viewing platform with interpretive displays midway along the new Wildlife Drive. Also construct a shallow 1/4th-acre pond in the marsh in front of the viewing platform location to create deepwater habitat for turtle and wading bird use in the summer, and to provide fill needed to create a vehicle parking pull-off for the viewing platform.

New Holland Trail

- Place directional signs at the points where trail returns to the photo blind trail.

- Keep the cypress needles cleared off the New Holland Trail boardwalk.

Other

- Construct a 130-foot boardwalk trail and viewing platform at the end of East Canal Road to allow visitors to experience Fisher Slough, a natural open water wetland adjacent to Lake Mattamuskeet.

- Make sure observation spots and photo blinds are noted on the general brochure and tear sheet map.

- Continue to participate in Wings over Water.

- Keep vegetation cut in front of photo blind.

- Add logs and a perch area in front of photo blind to create resting areas.

- Provide information in brochures and website about seasonal viewing opportunities.
- Put brief information in the brochure about the hiking opportunities at Rose Bay Area and Sandy Dike Road as places for wildlife observation and solitude.
- Post refuge wildlife list on website.
- Move the gate on East Canal Road to the bridge area so that visitors can access the trail and photo blind when the area is closed for hunting.
- Promote the hunting blinds as seasonal observation/photo blinds.
- Add a parking area for visitors with disabilities at the Highway 94 Observation deck.
- Have a quarterly wildlife observation tour.
- Expand volunteer group so that it can lead wildlife observation tours, allowing tours to be conducted on a regular basis.
- Work with Partnership for the Sounds and other nonprofit groups to have an annual photo contest and display the winning photos on the website and at the office.
- Construct one additional photo blind.

Objective 4-6: Commercial Ecotours – Continue to cooperate with partners to encourage commercial ecotours on the refuge.

Discussion: The CCP maintains the current management by evaluating permits as applications are received and evaluating the impacts of the ecotour activity. In general, the refuge looks positively at commercial ecotours as a way of expanding opportunities for wildlife observation, wildlife photography, and environmental education and interpretation.

Strategy:

- Review and evaluate proposed activities on a case-by-case basis.

Objective 4-7: Outreach – Increase outreach by increasing number of off-refuge programs, issuing 6-12 news releases annually, and annually updating refuge website.

Discussion: As with the environmental education program, outreach remains a challenge for the staff as there is no refuge outreach plan and no staff person to implement the program.

In support of the area Wings over Water event, refuge staff offer refuge tours during the first week of November. The refuge provides an annual Open House and Wildlife Tours the first Saturday in December. The refuge also hosts one annual fishing tournament in Lake Mattamuskeet and one horse trail ride, both of which are sponsored by local nonprofit organizations.

The refuge primarily uses two local newspapers, the *Coastland Times* and the *Washington Post*. It is a challenge to nurture and maintain relationships with staff at these newspapers because of turnover.

The refuge website is currently kept up-to-date by Alligator River NWR staff. Channel 7 news out of Washington, North Carolina, provides television coverage for the refuge.

The CCP is an improvement on the current management because it provides for an increase in the outreach audience and improvement in the quality of outreach tools. It provides for an extensive use of the Internet as an outreach tool. The addition of a park ranger for public use and an office clerk will facilitate the increases in outreach.

Strategies:

- Work with existing nonprofit partners to include messages about the refuge in their materials and programs.
- 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.
- Continue to conduct an annual open house and tours to view wintering waterfowl.
- Present programs off the refuge six times a year.
- Issue up to ten news releases annually.
- Participate in at least two outreach initiatives annually.
- Cooperate with print and video media to promote refuge activities.
- Maintain an Internet web site and update annually.
- Host an annual Chamber of Commerce meeting to include a field day tour of the refuge.
- Continue to provide information to the community about the management of the lake water, over which the refuge currently has no control. Identify places in the community where this information, in the form of brochures or information panels, may be displayed.
- Work with staff to assess opportunities to participate at local and regional community festivals/events:
  a) Determine level of participation.
  b) Determine which festival/event will be most appropriate.
  c) Participate at determined level.
- Establish and maintain good media contacts with the two local newspapers or any other media contacts, such as radio and TV stations which reach current and potential visitors.
- Continue to be a member of the Hyde County Chamber of Commerce.
- When the Mattamuskeet Lodge is reopened, partner with local community, NCWRC, and Partnership for the Sounds to hold annual wildlife festival (e.g., Swan Days).

- Find a volunteer to work with the refuge staff to implement a monthly refuge article in the local newspapers. (Volunteer could be from Partnership for the Sounds or Mattamuskeet Foundation.)

- Have the planning contractor provide quarterly updates on the status of the planning process. This could be published on refuge website and/or as a news release.

- Keep the website updated on a regular basis. Some links are confusing because they move back and forth between Mattamuskeet and other North Carolina refuges. Often it is unclear which refuge is being discussed.

- Maintain regular contact with local congressional staffers.

REFUGE ADMINISTRATION

Goal 5: Provide adequate staff, equipment, facilities, and funding to accomplish refuge goals and objectives while encouraging cooperative efforts with other agencies, NGOs, universities, volunteers, and other partners.

Objective 5-1: Staff – Maintain eight FTEs (full-time equivalent positions), including refuge manager, deputy manager, office support assistant, shared law enforcement officer, heavy mobile equipment mechanic, engineering equipment operator, maintenance mechanic, and forestry technician/firefighter. Add one FTE biologist, one FTE refuge operations specialist, one maintenance worker, one park ranger, and replace the shared law enforcement officer with an officer dedicated to the Mattamuskeet Complex, all for a total of 12 FTEs.

Discussion: As noted in a number of places in this chapter, the existing staff of eight FTEs is insufficient for carrying out all of the functions needed to fully implement the CCP. Filling the additional positions recommended will enable Mattamuskeet NWR to fulfill the purposes for which it was established, as well as implementing the many objectives and strategies proposed in this CCP to meet the refuge's goals.

Strategies:

- The biologist's duties will entail working on a number of the objectives and strategies listed under the fish and wildlife population and habitat management goals.

- The refuge operations specialist's duties will encompass all five of the CCP's goals. This individual will work closely with and under the supervision of the refuge manager. The individual will also serve in a manager training position, which is an important Servicewide need.

- The maintenance worker's duties will relate primarily to the habitat management and refuge administration goals.

- The park ranger's duties will primarily entail implementation of the objectives and strategies under the visitor services' goal.

- The dedicated law enforcement officer's duties will focus on the resource protection and visitor services' goals of the Mattamuskeet NWR Complex.

- Manage personnel for maximum performance and efficiency.

- Recognize employee performance annually through the employee incentive program.

- Provide staff with professional, technical, and leadership development training mandated by Service policy.

Objective 5-2: Facilities – By 2010, construct and open new refuge headquarters/visitor contact station and new maintenance workshop, and replace two staff houses. In addition, replace two additional staff houses by 2015.

Discussion: In the upcoming years, the Mattamuskeet Lodge and refuge headquarters area, including the office and visitor contact station, maintenance workshop, equipment storage yard, and refuge staff housing, will be undergoing major changes. The current office is undersized even for today's downsized staff levels, and relies on the use of an attached trailer.

Strategies:

- Maintain and properly store equipment to ensure the safety of the refuge staff and the public.

- Conduct real (infrastructure) and personal (equipment) property inventories annually.

- Replace the minimum property necessary to meet the refuge needs; dispose of excess property in a timely fashion.

- Work closely with architects, engineers, and construction contractors, and the Regional Office during facility design and construction to ensure that new facilities will meet refuge needs, plans, and specifications, including adequate office space for meetings and public display areas.

- Maintain the facilities according to the Fish and Wildlife Service Manual, equipment manufacturers' recommendations, and hazardous materials handling guidelines.

Objective 5-3: Partnerships – Continue to partner with NCWRC, Partnership for the Sounds, TNC, Mattamuskeet Foundation, Hyde County, Ducks Unlimited, East Carolina University, North Carolina Department of Corrections, and 10 volunteers. Within 15 years of CCP approval, establish a Friends Group at Mattamuskeet NWR and increase number of volunteers and interns. Institute work camper program and provide two pads with hookups for recreational vehicles.

Discussion: The refuge manager is a member of the Hyde County Chamber of Commerce, the most active economic promotional group in Hyde County. The refuge has a close partnership with Ducks Unlimited. In the recent past, Ducks Unlimited has generously donated hundreds of thousands of dollars for the replacement and installation of moist soil impoundment pumping stations. The refuge has formal agreements with the Partnership for the Sounds and the Mattamuskeet Foundation. The refuge manager serves in an ex-officio status with the Partnership for the Sounds. In the past, the Partnership for the Sounds has assisted with refuge projects, such as the New Holland Trail boardwalk and the new Wildlife Drive. In an agreement with the Partnership for the Sounds, 40 percent of proceeds from the sale of the Mattamuskeet DVD will be donated to the refuge. The refuge has a good working relationship with the Hyde County Waterfowl Association. In a show of appreciation, the Waterfowl Association held a picnic at the lodge for

refuge staff and supporters. In the spring, the refuge hosts a horseback riding tour sponsored by a local nonprofit organization; in 2006, there were 200 participants.

Refuge management requires an extraordinary amount of coordination because the refuge administers a lake that affects the hydrology of a large area around the refuge, and the lake provides recreation for 130,000 visitors. The refuge is in close proximity to the Swanquarter NWR and Gullrock State Game Land.

Shortages of staff and funding can sometimes be met through programs that involve partnerships, such as volunteer programs, refuge support groups, and cooperating associations. Although volunteer programs require an intense amount of staff time initially, once they are operating, the staff time is substantially reduced, and the benefits far outweigh the initial and continued investment.

Volunteers possess knowledge, skills, and abilities that can enhance the scope of field station operations, such as providing additional visitor services through interpretive programs and demonstrations, or organizing special events. Refuge support groups and cooperating associations can provide additional funding sources for a variety of projects and programs that are usually related to, but not limited to, improving visitor services.

At present, the refuge manages a minimal volunteer program. The permanent loss of the biologist position has greatly reduced the volunteer program, since the biologist managed the visitor services' and volunteer programs for the refuge. Volunteers must sometimes travel great distances to reach the refuge and there is not adequate housing for staff or volunteers in nearby communities. Volunteers and interns are currently offered the use of a vacant refuge residence, or for short stays, a residential trailer on the refuge, which is supplied by East Carolina University and is often available. However, the refuge residence may not be available if a refuge biologist is hired and the university facility is planned for removal; it will be replaced by camper pads for resident volunteers who will be managed by the refuge. There may possibly be lodging available for volunteers in the Mattamuskeet Lodge once renovation is completed, depending on the type of programs and facilities instituted by the NCWRC

The Partnership for the Sounds and the Mattamuskeet Foundation are nonprofit "Friends Groups" that contribute to the refuge. Priorities (missions) of these groups are different than refuge priorities, but match some of the needs of the refuge, including environmental education and interpretation and increased opportunities for ecotourism. There is a Memorandum of Agreement with the Partnership for the Sounds and there are plans to develop a similar agreement with the Mattamuskeet Foundation. The Mattamuskeet Foundation recently funded the development of a video of the refuge; proceeds will go towards environmental education in local schools.

Strategies:

- Continue coordination with the Partnership for the Sounds, North Carolina Wildlife Resources Commission, East Carolina University, Mattamuskeet schools, and other local, state, and federal agencies and nongovernmental organizations to conduct refuge operations, research, environmental education, and fire management.

- Maintain formal and informal communication with cooperating agencies and organizations.

- Develop cooperative agreements as necessary to support coordination with agencies and organizations.

- Assign a staff person to be in charge of the volunteer program and send this individual to volunteer training.

- Develop a volunteer plan.
  a) Work with staff to identify ways that volunteers can assist with work (especially projects and jobs that would not require a lot of staff oversight).
  b) Develop brief job descriptions of the work.
  c) Recruit volunteers to assist with the work.

- Contact the Service's Regional Volunteer Coordinator for assistance.

- Develop trailer pads for volunteers and initiate a work camper program.

- Use volunteers to provide visitor contact at the office and during weekends.

- Expand volunteer group to provide more refuge tours.

- Potential sources for recruiting volunteers include:
  a) State retired teachers association
  b) AmeriCorps
  c) Elderhostel
  d) School clubs
  e) Volunteer.gov
  f) Mattamuskeet Foundation
  g) Partnership for the Sounds
  h) Civic groups
  i) Boy Scouts and Girl Scouts
  j) Conservation organizations
  k) National work camper websites and newsletters

- Update the agreements with the Partnership for the Sounds and the Mattamuskeet Foundation to specifically explain the relationship including what happens to the income from sales items at the office.

- Develop a Friends Group with focus specific to Mattamuskeet NWR.

- Develop a Memorandum of Understanding (MOU) with the state regarding the operation of the lodge as it relates to visitor services.

- Develop a facilities list and work with local groups to "adopt" a facility to maintain.

V. Plan Implementation

INTRODUCTION

Refuge lands are managed as defined under the National Wildlife Refuge System Improvement Act of 1997. 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 Mattamuskeet NWR, this section identifies projects, funding and personnel needs, volunteers, partnerships opportunities, step-down management plans, a monitoring and adaptive management plan, and CCP 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 projects are listed in Table 14.

FISH AND WILDLIFE POPULATION MANAGEMENT

Project: 97002
First-Year Request: $150,000; Recurring Request: $10,000
Station Rank – 4 (Mattamuskeet Tier 2)

Conduct four biological research studies to improve resource management on all three refuges (Mattamuskeet/Cedar Island/Swanquarter). The studies are (1) analyzing specific needs and use patterns of declining neotropical birds on all three refuges; (2) analyzing the effects of aluminum flap gates and experimental fish weirs, installed in water control structures, to permit the passage of fish into the lake, which could lead to recommendations for improvements to benefit anadromous fishes; (3) analyzing water quality, particularly its impacts on fish, vegetation, and waterfowl; and (4) evaluate the effects of fire in marsh habitats on plants and wildlife. Results of the studies will be used to determine management practices that will benefit habitat quality and wildlife. Funding will be used to contract with universities or other research entities to conduct the studies and make management recommendations.

Table 14. Summary of projects.

PROJECT NUMBER	PROJECT TITLE	FIRST YEAR COST	RECURRING ANNUAL COST	STAFF (FTE'S)
Tier I RONS projects				
97009	Control Invasive Phragmites and Alligatorweed	$377K	$44K	0
00005	Conduct Biological and Aquatic Study of Lake Mattamuskeet	$118K	$12K	0
Tier II RONS projects				
97004	Improve Moist Soil Management	$301K	$11K	0
97003	Improve Water Management on Lake Mattamuskeet and 11 Impoundments	$133K	$68K	1
00003	Increase Law Enforcement Capabilities and Public Safety	$38K	$8K	0
97002	Conduct Four Biological Studies to Improve Management Techniques	$160K	$10K	0
00006	Conduct Waterfowl Food Studies on Three National Wildlife Refuges	$95K	$5K	0
97023	Enhance Environmental Education and Outreach Programs	$133K	$68K	1
97028	Develop Conceptual Site and Exhibit Plans	$192K	$0	0
00007	Acquire High Resolution Aerial Photographs for Three National Wildlife Refuges	$50K	$0	0
99005	Improve Management and Protection of Farm Service Agency Easements	$76.5K	$29K	0.5
00017	Conduct a Cultural Resource Survey	$100K	$0	0

Project: 00006
First-Year Request: $90,000; Recurring Request: $5,000
Station Rank – 5 (Mattamuskeet Tier 2)

Conduct a food habitats study for wintering waterfowl on Mattamuskeet, Swanquarter and Cedar Island NWRs. This study will analyze the food habitats in natural and managed wetlands. A current understanding of waterfowl food habitats on the wintering grounds is critically needed to make wise habitat management and restoration decisions. The existing information on waterfowl habitats is several decades old and in need of updating. Equipment is available, but a temporary technician and a contractor to identify food items are needed to conduct this study.

HABITAT MANAGEMENT

Project: 00005
First-Year Request: $106,000; Recurring Request: $12,000
Station Rank – 2 (Mattamuskeet Tier 1)

Conduct a study of fish communities, aquatic organisms, and water quality in the 40,000-acre Lake Mattamuskeet, North Carolina's largest natural lake. The 50,180-acre refuge winters 125,000 to 200,000 birds annually, mostly waterfowl, including about 30 percent of the Atlantic population of tundra swans. These migratory birds are very dependent on the refuge lake and surrounding habitats. This study will assess the health of the lake's fishery, document the status of other aquatic organisms, and analyze water quality (salinity, dissolved oxygen, pollutants, toxins). The shallow nature of Lake Mattamuskeet and the recent shift in local agricultural practices to cotton farming (which requires a significant use of pesticides) warrant this study. The purpose of the study is to collect essential data needed to assess and monitor the health of this significant lake basin and to identify any existing and potential impacts to refuge wildlife and habitat.

Project: 97004
First-Year Request: $290,000; Recurring Request: $11,000
Station Rank – 1 (Mattamuskeet Tier 2)

Improve management capabilities for 2,100 acres of moist soil units. This will be achieved by purchasing equipment to properly manage the units and constructing a pumping station at MI-9. Equipment needs include an offset disc and excavator for moist soil management. Supplies for the MI-9 pumping station include a 30" low-lift pump, a diesel motor power unit, and materials needed to fabricate the pump station and shed. Mattamuskeet NWR has nine impoundments (2,100 acres) managed as moist soil units to provide habitat for waterfowl, shorebirds, and other wildlife. These moist soil areas comprise only 5 percent of the refuge's land base, but account for a significant proportion of waterfowl use. Mattamuskeet NWR is one of the most important wintering areas for waterfowl along the Atlantic Flyway, especially for northern pintails and tundra swans.

Project: 97003
First-Year Request: $65,000; Recurring Request: $68,000
Station Rank – 2 (Mattamuskeet Tier 2)

Improve water level manipulation capabilities of Lake Mattamuskeet (40,000 acres) and 11 managed impoundments (2,648 acres). Some impoundments are not properly managed each year due to time and staff restraints. The addition of a biological technician will increase management capabilities and maximize the benefits of the lake and impoundments. Proper water level management is crucial to the production of plants that provide food and cover to sustain waterfowl and other migratory birds

during the winter and migration periods. This position will monitor water levels, operate and maintain pumps, regulate water control structures, and maintain dikes. This complexity of wetlands provides feeding and resting habitat for 125,000-175,000 wintering waterfowl each year, as well as other migratory birds and resident wildlife. Mattamuskeet NWR is one of the largest over-wintering areas for northern pintails and tundra swans in the Atlantic Flyway.

RESOURCE PROTECTION

Project: 97009
First-Year Request: $333,000, Recurring Request: $44,000
Station Rank – 1 (Mattamuskeet Tier 1)

Enhance wetland habitat for waterfowl and other migratory birds by controlling two invasive plant species: Phragmites and Alligatorweed. These two invasive plants readily out-compete desirable wetland plant species, resulting in degraded habitat that is less attractive to migratory birds. An existing herbicide treatment program for Phragmites needs to be expanded by 25 percent. Also, to reduce the program's dependence on toxic chemicals, a mechanical treatment option needs to be implemented. A specialized marsh vehicle (with a hydraulic-driven mower or a roller chopper head) is needed to mechanically control Phragmites in the marsh areas of Lake Mattamuskeet. Herbicide chemicals are also needed to treat Alligatorweed. The project includes a storage building (approved for herbicide and toxic chemicals) to comply with current safety and environmental standards.

Project: 00003
First-Year Request: $30,000; Recurring Request: $8,000
Station Rank – 3 (Mattamuskeet Tier 2)

Improve law enforcement capabilities to protect wildlife, facilities, and visitor safety. Current law enforcement equipment is not sufficient to deal with problems that occur on the refuge. New supplies will be purchased to provide the law enforcement staff with equipment that will increase officer safety and the effectiveness of their activities. Equipment, such as night vision scopes, surveillance cameras, field test kits for drugs and alcohol, lockers, etc., will be used to document violations. The lockers are needed to properly secure evidence, abandoned property, and law enforcement equipment.

Project: 00007
First-Year Request: $50,000; Recurring Request: $0
Station Rank – 8 (Mattamuskeet Tier 2)

Acquire a complete updated set of high resolution aerial photographs for Mattamuskeet, Swanquarter and Cedar Island NWRs. The photographs are needed to assess habitat types for management decision-making purposes. The maps will help in tracking invasive plant species and monitoring the effectiveness of various treatments to eradicate and control their spread. The current conventional sources of photographs are outdated and have limited value for reference.

Project: 99005
First-Year Request: $47,500; Recurring Request: $29,000
Station Rank – 9 (Mattamuskeet Tier 2)

Improve protection and management of Farm Service Agency easements. Mattamuskeet NWR is assigned the responsibility of managing 14 Farm Service Agency easements located on private lands. The easements, totaling 623 acres, are scattered throughout seven counties. The refuge has

a legal mandate to protect the easements. Annual inspections need to be made to ensure compliance by the landowners. Habitat work can also be done to improve to easements for wildlife. The easements do not receive the attention they need, due to other refuge priorities and limited resources. This project will provide a part-time biological technician to write a habitat management plan for each easement, conduct annual compliance checks, and implement management to improve wildlife habitat. The easements are considered part of the National Wildlife Refuge System.

Project: 00017
First-Year Request: $100,000; Recurring Request: $0
Station Rank – 10 (Mattamuskeet Tier 2)

Conduct a comprehensive cultural resource survey and literature and background search on Mattamuskeet NWR. A limited survey and search was done in 1978. This survey only concentrated on development sites. The original survey report suggested that 460 acres of the refuge contained possible prehistoric sites and recommended additional surveys. An intensive survey is needed to complete the cultural resource inventory. The work will be accomplished under contract. This information is needed to protect areas of significant cultural importance.

VISITOR SERVICES

Project: 97023
First-Year Request: $65,000; Recurring Request: $68,000
Station Rank – 6 (Mattamuskeet Tier 2)

Increase environmental education, outreach, and public use programs by hiring an environmental education specialist. The specialist will coordinate and expand ongoing educational activities with the Partnership for the Sounds, East Carolina University, and other environmental and educational groups. Environmental programs and workshops will be presented at the Mattamuskeet Lodge and at off-refuge locations. Offsite exhibits, outreach videos, and informational leaflets will be developed and presented to the public in various ways. News releases highlighting refuge and ecological events will be made available to media on a regular basis. Filling this position will assist in the public becoming aware of the Service, the refuge, and the ecosystem system.

REFUGE ADMINISTRATION

Project: 97028
First-Year Request: $192,000; Recurring Request: $0
Station Rank – 7 (Mattamuskeet Tier 2)

Develop concept plans for future interpretive facilities and visitor center exhibits. The plans will locate appropriate sites for trails, boardwalks, observation areas and other interpretive facilities. The types of interpretive facilities which are needed will be addressed. The scope and types of future visitor center exhibits will be developed. The plans will provide information and details needed to develop future public use facilities and provide adequate cost estimates for planning purposes.

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 6). Of the nine positions, eight full-time equivalents (FTEs) are located at Mattamuskeet NWR. Of the nine positions, one is funded for fire management.

This CCP recommends adding another 4.5 FTE positions to the existing staff for a total of 12 positions (Figure 7). Added will be one biologist, one refuge operations specialist, one maintenance worker, one park ranger, and one dedicated law enforcement officer (officer is currently shared with Pocosin Lakes NWR). The biologist will focus primarily on wildlife, fisheries, and habitat objectives and projects. The refuge operations specialist will assist the deputy refuge manager on all aspects of refuge management. The maintenance worker will be involved with habitat management (e.g., moist soil units) and maintenance and upkeep of facilities (e.g., buildings, roads, and other structures and infrastructure). The park ranger position will be crucial to our expanded visitor services, including education and outreach. The dedicated law enforcement officer will 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 will provide a law enforcement presence during hunting and fishing seasons, and thus reduce the probability and severity of violations.

PARTNERSHIP AND VOLUNTEER OPPORTUNITIES

A key element 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 fortify partnerships with the Friends of Mattamuskeet Lodge and the Partnership for the Sounds, as well as sporting clubs, elementary and secondary schools, and community organizations. At regional and state levels, partnerships may be established or enhanced with organizations such as East Carolina University, The Nature Conservancy, Ducks Unlimited, the Audubon Society, the North Carolina Wildlife Resources Commission, and the North Carolina Division of Marine Fisheries.

The refuge depends on volunteers extensively, especially for its biological program. Volunteers currently contribute 1,000 staff hours annually; this CCP anticipates even greater contributions of time. The refuge utilizes 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 will take the opportunity to expand the volunteer program and to develop and deepen partnerships.

Figure 6. Current staffing chart for Mattamuskeet National Wildlife Refuge.

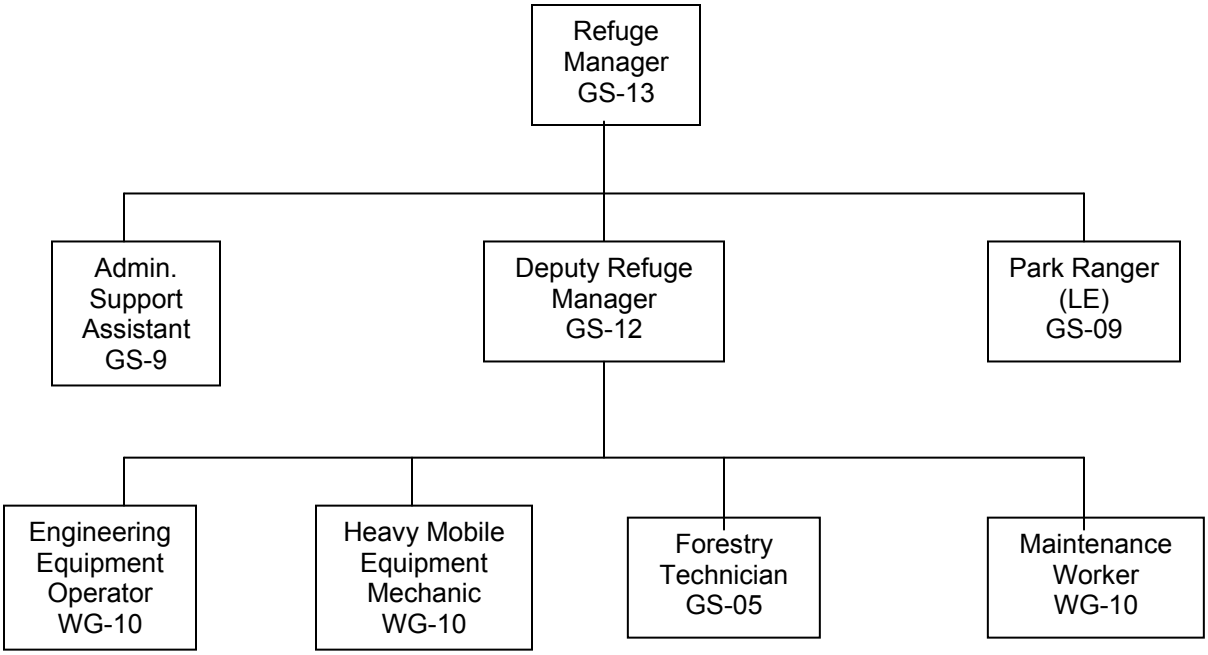
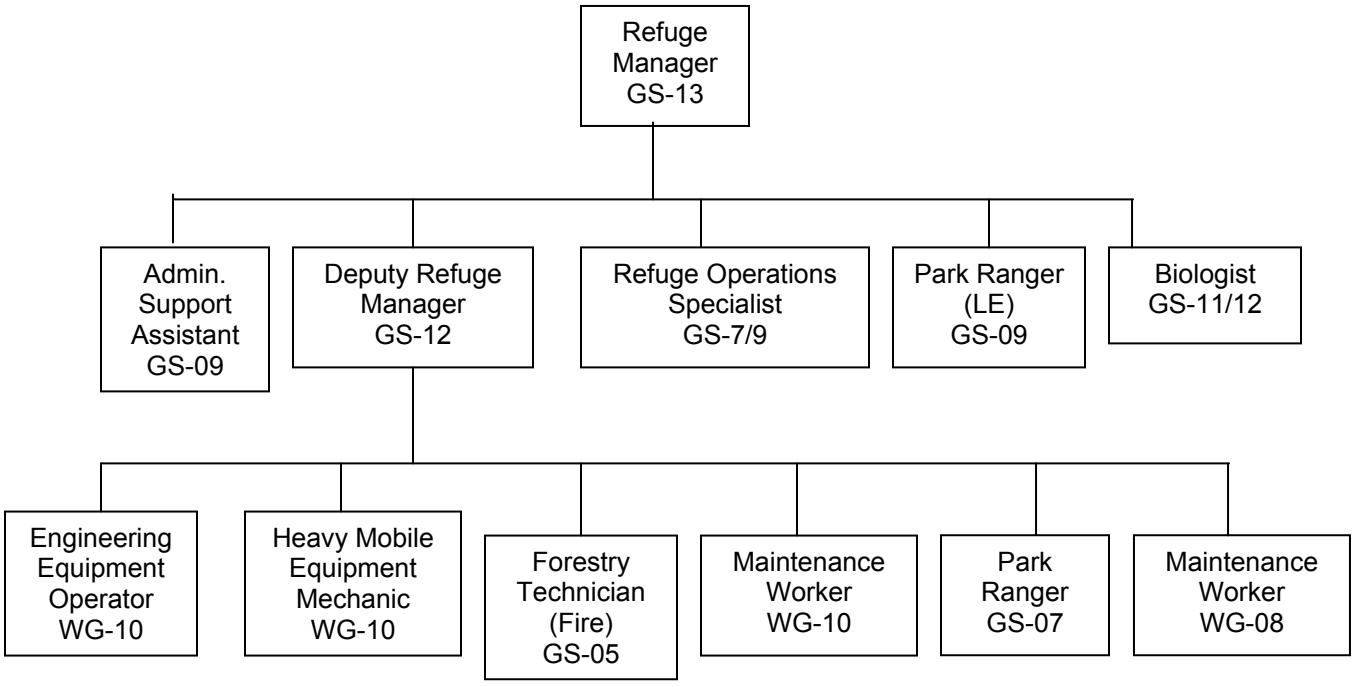


Figure 7. Proposed future staffing chart for Mattamuskeet National Wildlife Refuge.



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 15) 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 15. 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 in an overall plan.	2013
Moist soil/Water Management Plan (Update): This plan will describe the strategies and procedures (timing and duration of flooding and disturbance) for manipulating the refuge's water management units to meet habitat management objectives.	2012
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

Step-down Plan	Completion Date
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, nutria, feral swine, and resident Canada geese.	2012
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, and environmental education and interpretation 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
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
Hunting Plan (Update): This plan will address any proposed changes to the hunting program prior to actual implementation, such as a new archery deer hunt, expanded gun deer hunts, or other major changes.	2012

Step-down Plan	Completion Date
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
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

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

PLAN REVIEW AND REVISION

The CCP will be reviewed annually as the refuge's annual work plans and budgets are developed. It will also be reviewed to determine the need for revision. A revision will occur if and when conditions change or significant information becomes available, such as a change in ecological conditions or a major refuge expansion. The CCP will 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 will be subject to public review and NEPA compliance.

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.

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.

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

Catadromous: Migratory fishes that spend most of their lives in freshwater and migrate to saltwater to breed.

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.
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.
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).
Ecosystem:	A dynamic and interrelating complex of plant and animal communities and their associated nonliving 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.
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 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.
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).
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).
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.
Improvement Act:	The National Wildlife Refuge System Improvement Act of 1997.
Informed Consent:	The grudging willingness of opponents to “go along” with a course of action that they actually oppose (Bleiker).

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.
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 nonnative, 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).
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.
Preferred Alternative:	This is the alternative determined (by the decision-maker) to best achieve the refuge purpose, vision, and goals; contributes to the Refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management.
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 Purposes:	See Purposes of the Refuge.
Songbirds: (Also Passerines)	A category of birds that is medium to small, perching landbirds. Most are territorial singers and migratory.
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).
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.
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

ACRONYMS AND ABBREVIATIONS

BCC	Birds of Conservation Concern
BRT	Biological Review Team
CAMA	Coastal Area Management Act (North Carolina)
CCP	Comprehensive Conservation Plan
CFR	Code of Federal Regulations
cfs	cubic feet per second
CZMA	Coastal Zone Management Act
DCM	Division of Coastal Management (North Carolina)
DENR	North Carolina Department of Environment and Natural Resources
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 employee
FWS	U.S. Fish and Wildlife Service (also Service)
FY	Fiscal Year
GIS	Geographic Information System
GPS	Global Positioning System
NEPA	National Environmental Policy Act
NCDCM	North Carolina Division of Coastal Management
NCWRC	North Carolina Wildlife Resources Commission
NGO	nongovernmental organization
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
SAV	submerged aquatic vegetation
TFT	Temporary Full Time
USC	United States Code
USFWS	U.S. Fish and Wildlife Service (also Service)

Appendix B. References and Literature Cited

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Appendix C. Relevant Legal Mandates and Executive Orders

STATUTE	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 nonfederal 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.

STATUTE	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.

STATUTE	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.

STATUTE	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 preserve 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.

STATUTE	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 nongame bird 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.

STATUTE	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.

STATUTE	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.

STATUTE	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-oriented 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 nongame 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.

STATUTE	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.

STATUTE	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; preserves 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 preserved 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 preserve 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 preserve 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 preserve, 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. 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 nonfederal 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 :

The U. S. Fish and Wildlife Service (USFWS or Service) is preparing a Comprehensive Conservation Plan (CCP) that will provide overall management guidance for Mattamuskeet National Wildlife Refuge over the next 10-15 years. The CCP includes goals, objectives and strategies addressing wildlife population management, habitat management and public use of the refuge. It also includes specific projects that tie into these goals, objectives and strategies.

Pursuant to Section 307(c)(1) of the federal Coastal Zone Management Act of 1972 as amended, the Service, as the federal agency responsible for the proposed undertaking (i.e., implementation of the CCP) has determined that the proposed project is consistent to the maximum extent practicable with the enforceable policies of North Carolina's federally approved coastal management program. This determination is based on review of the proposed project's conformance with North Carolina's coastal program policies, which are primarily found in Chapter 7 of Title 15A of North Carolina's Administrative Code and the draft June 2007 Hyde County CAMA Core Land Use Plan.

Details supporting this determination are provided in the CCP to which this determination is appended and relevant documentation from an Environmental Assessment (EA) being conducted pursuant to the National Environmental Policy Act (NEPA) of 1969 as amended. The EA was attached to the Draft CCP/EA and released in July 2008.

USFWS is requesting acknowledgement of the Division of Coastal Management's concurrence with this consistency determination. If you have any questions or require additional information please contact me at 252-926-4021or Bruce_Freske@fws.gov. Your time and effort regarding this matter are appreciated.

Sincerely,

Bruce Freske
Refuge Manager

CONSISTENCY DETERMINATION FOR
MATTAMUSKEET NATIONAL WILDLIFE REFUGE
COMPREHENSIVE CONSERVATION PLAN

Project Description

The National Wildlife Refuge System Improvement Act of 1997 requires the development of comprehensive conservation plans for all national wildlife refuges in the United States. Following a public review and comment period on the Draft Plan, a final decision will be made by the Fish and Wildlife Service that will guide Mattamuskeet 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 Plan proposes a management direction, which is described in detail through a set of goals, objectives, and strategies presented in Chapter IV of the CCP (Section A of this document). Chapter IV also contains measures to conserve resources and protect environmental quality. The Draft Plan addresses current management issues, provides long-term management direction and guidance for the refuge, and satisfies the legislative mandates of the National Wildlife Refuge System Improvement Act of 1997. While the plan provides general management direction, subsequent step-down plans will provide more detailed management direction and actions.

Chapter V in Section A lists and describes the priority projects proposed for Mattamuskeet Refuge under this plan. In addition, refuge staff will continue to conduct a number of wildlife and habitat management projects as well as provide for visitor services on the refuge, including fishing, hunting, and wildlife observation and photography. The CCP envisions little new construction, primarily a new refuge headquarters office/visitor contact station, workshop and maintenance yard, and up to four new employee dwellings. All construction will occur within the existing 400-acre administrative area; the new structures identified will be replacing existing antiquated structures, all of which will be demolished and removed from the site.

Hyde County Draft 2007 CAMA Core Land Use Plan Review

CAMA establishes “Areas of Environmental Concern” (AECs) as the foundation of the Coastal Resources Commission's permitting program for coastal development. An AEC is an area of natural importance: it may be easily destroyed by erosion or flooding; or it may have environmental, social, economic or aesthetic values that make it valuable.

According to the draft Land Use Plan (LUP), the proposed project is located within several types of AECs:

1. Public Trust Areas, including all water in artificially created water bodies that have significant public fishing resources and are accessible to the public from other waters. Lake Mattamuskeet, the ditches that drain into it and the canals that drain out of it would qualify as public trust areas.

2. Coastal and 404 Wetlands. Much of the refuge area would qualify as wetlands, including its marshes, moist soil units, pocosins, and bottomland hardwoods.

3. Protected Lands and Significant Natural Heritage Areas. Mattamuskeet Refuge comprises almost 12 percent of Hyde County. It is listed in the LUP as both the largest of 13 listed protected lands in the county, and the largest of 23 significant natural heritage areas. These areas are noted for their ecotourism potential.

In addition, the refuge is identified by the LUP as a "regionally significant park" along with Cape Hatteras national Seashore.

Other State Permits

No other state permits or approvals are needed for the USFWS to approve and begin to implement the CCP at this time. At such time as specific projects are in the planning stages, relevant permit(s) will be sought and consultation undertaken. For any project necessitating substantial excavation or ground disturbance, the Service will notify the State Historic Preservation Office per Section 106 of the National Historic Preservation Act.

NEPA Documentation

As noted earlier, Section B of the Draft CCP/EA was an Environmental Assessment of the proposed plan. Since it contained all the information required by 15 CFR 930.39, it was submitted as the "*Supporting Document*".

Appendix E. Public Involvement

SUMMARY OF PUBLIC SCOPING COMMENTS

The following comments from the public were received during both the 2001 and 2007 public scoping meetings. The 2001 comments are included to document this earlier effort because they are more extensive than those received in 2007, and were still relevant for use in developing the Draft CCP. The comments are listed by category.

2001 PUBLIC SCOPING MEETINGS

Fish and Wildlife Population Management:

- Announce waterfowl migration updates on local news
- Continue conducting research on black bears to determine home range and harvest potential
- Continue surveys and monitoring
- Control nutria in canals
- Develop a trapping program for furbearers, predators, beavers, and nutria
- Develop beaver management guidance
- Develop species list for all fish using the lake
- Evaluate food chain impacts of fire ants on other species
- Evaluate water management impacts to fish and wildlife on each refuge
- Examine water quality and silting in canals leading to the lake
- Improve fish access to the lake
- Speed up beaver eradication
- Stock Florida largemouth bass in the lake
- Study and evaluate anadromous fish populations
- Use money to raise ducks and geese
- Quit importing predators such as eagles (bald and golden), red wolves, coyotes, alligators; these species are a destroyer of our main wildlife species: ducks, geese, deer, quail, wild turkeys, rabbits, etc.
- Allow more or longer deer hunting on refuge for population control
- Conduct annual restocking with various species of fish
- Allow trapping of nonnative and native animals species such as nutria and beaver

Habitat Management:

- Clean out and regularly maintain duck boxes
- Connect larger blocks of land through corridors for black bear
- Control nonnative and invasive species like the common reed
- Coordinate with local landowners to maintain lake at appropriate levels
- Coordinate with nonprofit agencies to ensure that land conservation needs are met
- Determine whether FWS is purposely flooding adjacent land
- Determine whether high lake levels are converting adjacent uplands to wetlands
- Evaluate need for increased growth of cypress around lake
- Evaluate the impacts to adjacent landowners from management practices
- Improve fish habitat

- Increase current eradication budget
- Lower water levels in the lake
- Monitor effect of water levels on duck populations in the lake
- Increase funding to accommodate programs
- Provide education on how the lake works and the role FWS plays in lake level maintenance
- Review and coordinate on the Wetland Reserve Program
- Study summertime water temperature and DO (dissolved oxygen) in canals
- Survey canals for deepwater habitat
- Blast canals with dynamite
- Clean out silted canals to restore their water carrying capacity
- Conduct commercial thinnings
- Conduct regular prescribed burns
- Consider a 'refuge workday'
- Control beavers to help control ditch problems
- Cooperate with other agencies to share all available data
- Coordinate with NCWRC to provide early successional habitat for bobwhite quail
- Engage in cooperative research efforts with other agencies (i.e., black bear)
- Evaluate data for use in general management
- Evaluate salt intrusion into lake from water control gates
- Evaluate the size and effectiveness of existing firebreaks
- Evaluate the validity of timber harvest for the purpose of fire control
- Include people in the planning process
- Increase data collection efforts
- Involve local citizens from each county in the planning process
- Maximize wildlife benefits inside impoundments, using mechanical and chemical means
- Obtain more funding to manage land in possession
- Obtain staff and equipment to fully implement prescribed burn program
- Re-design water control gates
- Speed up structure replacement process by using old design
- Use fire in the role it played naturally
- Use forestry techniques such as thinnings, for support and benefit of wildlife
- Prevent saltwater intrusion into the lake
- Address strange weed problems
- Address drainage to the lake and drainage from the lake
- Study and manage appropriate lake water level
- Address wash on NC 94 Lake Road by maintaining with vegetation and rock
- Procure funding for continued maintenance of the four main outfall canals to the lake
- Repair dikes where damaged
- Maintain water control structures or replace using good low country engineering technology
- Consider more water control structures
- Seek more federal funds for canal maintenance and prioritize monies received towards this maintenance rather than habitat enhancement
- Expand control of nonnative plant species such as phragmites
- Do a better job managing the forest resources
- Use a conservation outlook and strategy, not preservation
- Continue to allow private landowners to maintain their individual drainways to the lake and manage lake water levels so as not to impede drainage of surrounding private lands

Resource Protection:

- Acquire more land
- Charge reasonable and low user fees to offset tax losses, returning them to the county
- Consider buying more easements
- Control trespassing
- Control waterfowl baiting on adjacent land
- Cooperate to obtain funding for improved wildlife management, rather than acquisition
- Cooperate with private landowners to manage land for wildlife
- Coordinate with county managers
- Coordinate with other agencies prior to acting on land management practices
- Create more wilderness
- Create wilderness areas
- Create wildlife corridors
- Develop a connecting corridor between Swanquarter and Mattamuskeet, through acquisition
- Develop and enforce a 'no wake zone' within 300 feet of other boats
- Develop economic cost/benefit analysis of the refuge's impact on local economy
- Develop education program on other refuges in the area
- Develop public use education programs on what wilderness designations mean
- Do not acquire more land
- Do not consider corridors in refuge management
- Do not create more wilderness
- Evaluate and educate public on tax revenue cost sharing program
- Evaluate economic magnitude of current income producing refuge public uses
- Evaluate management limitations of wilderness designations
- Evaluate the condition of continuously flooded uplands adjacent to the lake
- Improve lake safety
- Include history and interpretative material on the lake, the lodge, and surrounding area
- Incorporate local culture and heritage of the area into refuge programs
- Increase law enforcement
- Maintain existing lands with current budget
- Prohibit certain size boats and motors on the lake
- Provide lists of permitted activities in wilderness areas
- Re-evaluate existing surveys used to acquire private property
- Restore Mattamuskeet Lodge
- Secure funds for lodge restoration
- Transfer lodge ownership to another agency
- Use advice from local experts when developing plans

Visitor Services:

- Add a boat ramp on NC 94
- Champion ecotourism
- Allow horseback riding
- Allow nighttime bass fishing in the summer
- Attract ecotourism
- Consider rotating or moving blind to varying locations
- Consider sailing, kayaking, canoeing on lake

- Consider windsurfing, remote control model boats
- Continue other public use activities
- Continue providing access to Bell Island fishing
- Continue use of the lodge
- Coordinate with NCWRC in managing the black bear hunts
- Coordinate with NCWRC on hunting activities
- Determine whether mountain bikes could use the road system
- Develop appropriate signage indicating where existing facilities are
- Develop canoe and kayak trails for public use
- Develop more public facilities
- Develop other areas on the refuge for hunting
- Develop program to improve view of the lake by eradicating common reed
- Develop public education programs on positive effects of refuge management practices
- Develop public school programs on wilderness area
- Don't dig a ditch to catch mud around new boat ramps
- Educate and involve more youth in hunting programs
- Evaluate camping platform needs for outfitters
- Evaluate the potential for quail hunting on the refuge
- Expand public uses other than hunting and fishing
- Improve existing blind
- Improve public outreach to reduce general feelings of mistrust
- Increase education and outreach
- Increase facilities and programs
- Increase hiking trails
- Increase programs to attract more people
- Increase public access
- Increase public waterfowl hunting
- Increase refuge involvement with public use activities
- Increase signage regarding road access
- Increase the number of duck blinds
- Increase volunteer program
- Maintain east side of the causeway to improve view
- Make more roads available
- Make public use more convenient
- Open the refuge roads and trails to horseback riding
- Prohibit certain size boats and motors on the lake
- Recognize the importance of the refuge to Hyde County
- Renovate the lodge or surrender it to another agency
- Post signage for swan observation
- Bring back Nature Week, which was an environmental educational day camp begun about 1988 for grades 1-5
- Implement other environmental education programs to bring the public to the refuge to watch and know about nature.

Refuge Administration:

- Fully staff the refuge
- Separate management of Mattamuskeet and Swanquarter NWRs from Cedar Island NWR

- Keep management styles flexible
- Utilize volunteers for maintenance, manpower and equipment
- Work with other agencies to maximize the benefit of their work
- Provide more competitive salaries
- Use funds for better maintenance instead of acquisition
- Maintain the infrastructure of the lake: canals, dikes, water control structures and pumps
- Staff has greatly improved relations between the refuge and area residents and should continue to do so.

2007 PUBLIC SCOPING MEETING

The following comments were received in response to the questions posed on the comment form distributed at the 2007 Mattamuskeet public scoping meeting, and include those received through the mail.

1. What do you think are the most important issues facing Mattamuskeet National Wildlife Refuge?

- Saltwater intrusion into the lake
- Maintenance of the infrastructure of the lake: canals, dikes, water control structures and pumps
- Strange weed problems
- Drainage to the lake and drainage from the lake
- Lake water level
- Wash on NC 94 Lake Road
- Funding for continued maintenance of the four main outfall canals to the lake

2. How do you think these issues should be addressed?

- Restore the water carrying capacity of the original canals
- Repair dikes where damaged
- Keep water control structures in good repair or replace using good low country engineering technology
- Control weed problems
- Canal clean out
- More water control structures
- Maintenance along NC 94 with vegetation and rock
- Seek more federal funds for canal maintenance and prioritize monies received towards this maintenance rather than habitat enhancement

3. Should refuge habitats and wildlife be managed any differently than they are today?

- Yes, quit importing predators such as eagles (bald and golden), red wolves, coyotes, alligators; these species are a destroyer of our main wildlife species: ducks, geese, deer, quail, wild turkeys, rabbits, etc.
- More or longer deer hunting on refuge for population control
- Annual restocking with various species of fish
- Control of nonnative plant species such as phragmites
- Trapping of nonnative and native animals species such as nutria and beaver

4. Are the types of public use and visitation permitted and encouraged by the refuge appropriate?

- Yes (2)
- Deer hunting season should be longer.
- Trapping by permit should be encouraged.
- Use of airboats, jet skis and small sailboats and sailboards should be allowed.
- More access on refuge roads to the public

5. Any other comments or suggestions you would like to make on how the refuge should be managed over the coming 15 years?

- Do a better job managing the forest resources.
- Use a conservation outlook & strategy, not preservation, as anything I have seen preserved was dead [sic].
- I would like to see a boat ramp on NC 94.
- I would also like to say that I think Mr. Freske and his staff have greatly improved the refuge and its relations with area residents.
- The management should continue to allow private landowners to maintain their individual drainways to the lake and should manage lake water levels so as not to impede drainage of surrounding private lands.

Additional Public Scoping Comments:

- Stock fish such as bass and strippers (hybrid) in the lake.
- Test water in lake to see what problems are present.
- Bring back Nature Week, which was an environmental educational day camp that began in 1988 for grades 1-5. [Note: Nature Week was a youth program produced by the combined efforts of the refuge and the Hyde County division of the North Carolina Cooperative Extension Service. The camp was conducted for one week each summer. It was based at the refuge until the lodge was closed, and then it was based at Ponzer. The 4-H building was not nearly as good a location (the trail, waters, and nature were missing). The camp lasted until 2004, for a total of about 16 years.]
- Other environmental education programs to bring the public to the refuge to watch and know about nature. We have been blessed with nature. Let's promote it by having programs that would bring tourists and well as residents to the refuge!

SUMMARY OF PUBLIC COMMENTS ON THE DRAFT CCP/EA AND SERVICE RESPONSES

This section summarizes all comments that were received on the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Mattamuskeet National Wildlife Refuge. A Notice of Availability of the Draft CCP/EA for public review and comment was published in the *Federal Register* on July 18, 2008 (73 FR 41371). Public comments on the Draft CCP/EA were accepted from July 18 to August 18, 2008. The Service received a total of 19 written comments from this public review. Fourteen of the written comments were from private citizens; four were from state government agencies; and one was from the Hyde County Chamber of Commerce.

AFFILIATIONS OF COMMENTERS

The table below identifies the names and affiliations of the individuals who submitted written comments on the Draft CCP/EA.

Name of Commenter	Affiliation
Kenneth W. Ashe	North Carolina Office of Geospatial and Technology Management
Rex Bartles	N/A
Jack & Trina Baumer	N/A
Clark Beeson	N/A
Jimmie L. Bowes	N/A
Harry Cosgrove	N/A
Bob Forkish	N/A
Arthur Greer	N/A
Steve Harmon	N/A
Will Hart	Aquifer Protection Section, Washington Regional Office, North Carolina Department of Environment and Natural Resources
Maola Hayes	Hyde County Chamber of Commerce
Art Manning	N/A
N/A	North Carolina Department of Environment and Natural Resources
Robert Newcomb	N/A
Daryl Ready	N/A
Stephen Rynas	North Carolina Division of Coastal Management
B. Sachaui	N/A
Sam Schipman	N/A
Mike Williams	N/A

The number of affiliations represented in the above table can be summarized as follows: federal agencies, 0; Indian Tribes, 0; state agencies, 4; local (city and county) agencies, 0; nongovernmental organizations, 1; private citizens (members of the general public, listed as “N/A” or no affiliation), 14; niversities, 0; and businesses, 0.

COMMENT MEDIA

The types of media used to deliver the comments are categorized as follows: e-mail - 15; fax - 3; and written (hard copy) letter - 1.

GEOGRAPHIC ORIGINS OF COMMENTERS

The geographic origins of the individuals who submitted written comments are North Carolina, 18; and New Jersey, 1.

SUMMARY OF PUBLIC COMMENTS AND SERVICE RESPONSES

The public comments received on the Draft CCP/EA addressed the concerns listed below. Some of the comments are paraphrased or combined (when more than one commenter made a similar point). Other comments are repeated verbatim. The Fish and Wildlife Service's responses to each concern are also provided.

Management Alternatives and Actions in the Draft CCP/EA

Comment: Alternative C, which expands hunting opportunities, is the best.

Service Response: Thank you for your comment. Alternative C was not selected as the Service's preferred alternative, and thus the basis for the CCP, because the demands it would place on expected staffing and budget in the coming years were deemed excessive. Alternative B, the Service's preferred alternative and the basis for the CCP, does offer some expanded hunting opportunities.

Comment: I would SUPPORT the broader efforts of ALTERNATIVE C in the draft document. (Alternative B would continue the existing hunts, but the refuge would explore how to increase youth hunting opportunities for deer and waterfowl and would work with the state to conduct activities that promote hunter recruitment and retention.) ALTERNATIVE C would expand on those efforts. As a member of the hunting community and a taxpayer, I support expanding hunting on the refuge.

Service Response: Thank you for your comment. Please see the previous response.

Comment: I am impressed by this Draft for the Mattamuskeet National Wildlife Refuge. The actions proposed in managing and conserving the fish and wildlife resources in this County in my opinion, have been well done. I feel that visitors and residents will gain much knowledge, pleasure and fun from the Refuge. Congratulations on a job well done.

Service Response: Thank you for your comment.

Environmental Permitting and Mitigations

Comment: Any open burning associated with subject proposal must be in compliance with North Carolina's regulations.

Service Response: The only open burning contemplated in the CCP is prescribed fire for the purpose of habitat management, which will be conducted in compliance with applicable state laws and regulations.

Comment: Demolition or renovation of structures containing asbestos must be in compliance with state regulations which require notification and removal prior to demolition.

Service Response: The refuge staff will follow state laws and regulations in conducting any such action on the refuge.

Comment: The Sedimentation Pollution Control Act of 1973 must be properly addressed for any land disturbing activity. An erosion and sedimentation control plan will be required if one or more acres is to be disturbed.

Service Response: The only construction work of any size identified in the CCP will be undertaken in the administrative area of the refuge, where construction of a new maintenance yard, staff housing, and a refuge headquarters/visitor contact station are contemplated over the 15-year life of the CCP. While it is unlikely that any one of these projects will approach or exceed one acre in size, North Carolina's sedimentation control law and regulation will be followed.

Comment: The Draft CCP/EA did not discuss water supply or wastewater treatment and/or disposal. These issues would be of concern mainly, but possibly not exclusively, in the continued operation of the lodge.

Service Response: The Mattamuskeet Lodge is no longer owned by the federal government but by the State of North Carolina, so that water supply and wastewater treatment and disposal is the state's responsibility.

Comment: Existing refuge facilities are located within the Special Flood Hazard Area for Hyde County. Executive Order 11988 directs all federal agencies to comply with the intent of the Federal Emergency Management Agency's National Flood Insurance Program requirements. Any new construction, or substantially improved existing structures, will be required to be elevated to the base flood elevation as shown on the effective Flood Insurance Rate Map.

Service Response: We are aware of this requirement and plan to make sure that any facilities we construct are at the appropriate elevation.

General Draft CCP/EA and Planning Process Shortcomings

Comment: The plan does not take account of reality and 2008 situations, with dirty ocean water causing pfisteria to fish, toxic mercury and too much carbon in ocean water, dirty air from prescribed burning, which causes lung cancer, heart attacks, strokes, asthma and allergies, a people population which is growing by leaps and bounds far beyond earth's capability to care for them, etc.

Service Response: Thank you for your comment. The CCP is not intended to be, nor could it be, a means to alleviate all of the environmental problems which affect the eastern U.S., but Chapter II does contain a section entitled "Ecological Threats and Problems" that covers some of the particular issues the refuge faces.

Comment: How do you justify not having animal protection groups invited for your conferences like you had on 9/25/07 [the goals, objectives, and alternatives workshop]? Why are they blacklisted?

Service Response: All participants in the goals, objectives, and alternatives workshop were established partners of the refuge, including representatives of federal or state land and wildlife management agencies and individuals or groups with particular expertise and an existing working relationship with the Mattamuskeet Refuge.

Fish and Wildlife Population Management – Deer Overpopulation

Comment: We have a problem controlling deer and other animal populations. Overpopulation will cause damage to crops, vehicle collisions and eventually disease and die-offs.

Service Response: Thank you for your comment. The refuge supports hunting programs, in part to avoid the problems you cite, that can result from an overpopulation of deer (i.e., deer numbers exceeding the carrying capacity of the available habitat).

Habitat Management – Cropland

Comment: What steps has refuge management taken to protect the national taxpayer owned land from the private agribusiness use, which deluges their sites with tons of toxic chemical pesticides, herbicides, etc. the arsenic they used until recently is deadly. None of those agribusinesses seem aware or concerned of Rachel Carson or of how they are polluting this earth. What is refuge management doing to stop this abuse of earth?

Service Response: The cooperative farming program, under which private farmers grow corn, soybeans and wheat on 191 acres of the refuge, provides food benefits for wildlife, particularly waterfowl. Farm chemical use is controlled by the refuge and is restricted to those herbicides, insecticides, and fertilizers with minimal environmental impacts.

Visitor Services (Public Use) – The "Big Six" Priority Public Uses

Comment: I urge you to do your best to include and promote wildlife hunting, fishing, observation, and education to the broadest swath of our citizenry. Lets do our best to include our children in our natural environment thus to have them get out there and appreciate what we have in our world, rather than sit home and vegetate on video games.

Service Response: Thank you for your comment. The CCP will encourage and promote all of these activities at the Mattamuskeet Refuge.

Comment: I am contacting you in favor of expanding the hunting, fishing and outdoor experiences available at Lake Mattamuskeet.

Service Response: Thank you for your comment. The CCP will allow for expanded hunting, fishing, and outdoor experiences on the lake.

Visitor Services (Public Use) – Hunting

Comment: I support expanded hunting opportunities in Mattamuskeet National Wildlife Refuge areas. I particularly support expanded hunting using bows and primitive firearms. I feel that the highest and best use of our wild lands is exposing our people to the land through hunting with low tech equipment.

Service Response: Thank you for your comment. All of Mattamuskeet NWR is open to deer hunting except for a 600-acre zone around the refuge's most developed areas. Hunters may take one antlered and one antlerless or two antlerless deer per day on Mattamuskeet NWR. Deer may only be taken with shotgun, muzzleloading rifle/shotgun, or bow and arrow during two, two-day hunts in October.

Under this CCP, the refuge will explore ways to increase hunting opportunities for both deer and waterfowl, especially for youths. We will continue to provide deer hunting opportunities in permitted hunts on 6,000 acres for 600 hunter days annually. We will also consider adding another two-day deer hunt in October, for a total of three paired hunts, as well as a bow hunting only season.

Comment: I support expanding hunting opportunities on ALL PUBLIC LANDS in the State of North Carolina.

Service Response: Thank you for your comment. Please see the response just above. The selected alternative in the Draft CCP expands hunting opportunities on Mattamuskeet Refuge.

Comment: I feel we should open any and all public assessable areas to the public for hunting.

Service Response: Thank you for your comment. The selected alternative in the Draft CCP maintains and expands hunting opportunities on the Mattamuskeet Refuge. The only area closed to hunting contains the refuge's most developed facilities and greatest use; this area is closed because of safety considerations.

Comment: I am in favor of allowing more hunting on the refuge. One of the biggest attractions of Hyde County is the hunting. The early refuge season doesn't do much because the deer are mostly off the refuge eating in the fields. The farmers kill them and waste them, all year around, night and day. It would be better to use them to fill sportsmans tags, than to have them killed off the refuge in the fields, year around. I am a dog hunter myself, but I have never liked seeing deer protected in the fall and killed year around in the fields. The same people that post their land in the fall are the ones killing deer for eating the crops. We will probably never see a managed dog hunt on the refuge, but it would afford handicapped and youth hunters more opportunities to see game. Number the stands and let them draw for them in a late season hunt.

Service Response: Thank you for your comment and information about deer management. Under this CCP, the refuge will explore ways to increase hunting opportunities for deer, including the addition of another two-day deer hunt in October, for a total of three paired hunts, and explore the merits of initiating a bow hunting season for white-tailed deer. However, late season deer hunts are not proposed as these hunts would cause too much disturbance to wintering waterfowl.

Comment: Waterfowling at Mattamuskeet is a quality experience. While success measured by the number of ducks in the bag is usually poor to mediocre, the beauty of the resource makes it a quality opportunity. Public waterfowling opportunities are very limited in North Carolina. The Wildlife Resources Commission has virtually eliminated waterfowling access to the NCWRC Game Lands by imposing a highly restrictive permit system. This has devastated waterfowling on public land in North Carolina.

Obtaining access to Mattamuskeet is already difficult. I apply for permits each year but have been selected only a few times. So, I often drive from Greensboro (about 4.5 hours each way) in the hope of a walk-on selection. You may imagine it is disappointing not to be selected, which wastes both a day of hunting season and a long drive. On occasion, I've hunted the impoundment blinds

So, I encourage you to increase hunter access opportunities at Mattamuskeet in several ways:

- Increase the number of hunting blinds.
- Relocate historically very nonproductive blind locations, or manage #5 & #6 food and water levels.
- Provide access to other areas of the Refuge, including some of the other impoundments.
- Expand the times available to include the September teal, October and November seasons.
- If possible, develop additional handicap hunter blinds similar to #1 (which would benefit my 78 year old father).
- Consider allowing boat access for free-lance hunting (no bind provided) to assigned hunting areas.

Service Response: Thank you for your comments and valuable suggestions, which we will consider closely in implementing the CCP's waterfowl hunting provisions in the coming years.

Comment: I am writing as a hunter, and avid believer in the beneficial management of our natural resources for future generations. I urge you to promote the alternative that would best increase youthful and adult participation in wildlife hunting and conservation so as to allow future and present generations the best access to these pursuits.

Service Response: Thank you for your comment. The selected alternative does increase both conservation and hunting opportunities on the refuge.

Comment: Anything that can be done to start youth hunting I wholeheartedly agree and uphold. My uncle started me hunting geese on the refuge when I was 13. I took my boys there for years after that. It is some of our best memories. They are 33 and 35 now.

Service Response: Thank you for your comment. Under Objective 4-2, the refuge will explore ways to increase hunting opportunities for deer and waterfowl, especially for youths. Strategies specifically related to youth include continuing to conduct a two-day youth waterfowl hunt; exploring the value of increasing waterfowl hunting opportunities by participating in the early season waterfowl hunts, as well as the late season youth hunt; and cooperating with the NCWRC on exploring and supporting ways of promoting hunter education, recruitment, and retention, particularly among youths.

Comment: I agree that Mattamuskeet should not only continue the hunts allowed now but also attempt to expand on the youth related activities and hunter recruitment and retention. I am sure the state could get some more help with the youth hunts at Mattamuskeet.

Service Response: Thank you for your comment.

Comment: As a long time sporting enthusiast and one that has taught both a daughter and a grand-daughter safe use of firearms, I fully support the expansion program plans. Teaching a young person both the enjoyment and responsibility of firearm safety is best done in a professional and controlled environment as planned.

Service Response: Thank you for your comment. The plan has a strategy under Objective 4-2 that calls for the refuge to cooperate with the NCWRC in exploring and supporting ways to promote hunter education, recruitment, and retention, particularly among youths.

Comment: Please allow youth hunting to happen.

Service Response: The CCP will allow for some expanded youth hunting opportunities at the refuge.

Comment: Wildlife and birds need full protection and especially from wildlife murderers - hunters. Hunting is not a compatible appropriate use on this land, which is owned by national taxpayers.

Service Response: Thank you for your concern and your comments. Hunting is a legitimate wildlife management tool on wildlands in general and national wildlife refuges in particular. Its dual benefits are as a form of outdoor recreation and as a means of controlling populations of target species. The National Wildlife Refuge System Improvement Act of 1997 explicitly identifies hunting as one of the public uses generally compatible with the purposes of national wildlife refuges, and Mattamuskeet Refuge is no exception. A compatibility determination for hunting has been prepared and is included in Appendix G of this CCP.

Visitor Services (Public Use) – Wildlife Observation

Comment: The numbers of wildlife watchers are growing every year and they should be serviced.

Service Response: Wildlife observation is one of the six priority public uses of national wildlife refuges, as established in the National Wildlife Refuge System Improvement Act of 1997. The CCP accommodates public visitors interested in observing and photographing wildlife on the refuge, and expands available opportunities for such.

Appendix B – References and Literature Citations

Comment: The bibliography used for research is very very old. Basing any future work and plan on these old bibliography works shows that the information you are using is outdated.

Service Response: The References Cited appendix contains entries spanning a number of decades, including the current one.

Appendix D – Draft Coastal Zone Consistency Determination

Comment: Based on our review of the Draft [CCP], the broad goals, objectives and strategies outlined appear to be consistent with the state's coastal program. The DCM [Division of Coastal Management] also recognizes that the proposed management program would be environmentally beneficial.

Service Response: The Service appreciates DCM's acknowledgement of the environmental benefits of the intent and actions proposed in the CCP.

Comment: Appendix D of the Draft contains a draft consistency determination. We would encourage the USFWS to prepare an analytical consistency determination that evaluates the proposed action in terms of specific relevant enforceable polices, such as management objectives and use standards of 15A NCAC 07H.0207 of Chapter 7 of Title 15A of North Carolina's Administrative Code. Along the analytical analysis line, the Hyde County land use review in the Draft CCP simply states that the refuge is in wetlands, public trust areas, and on protected natural heritage lands. How the proposed Draft would be consistent with the Hyde County Land Use Plan is not actually evaluated. However, the Draft does note that the refuge is recognized in the LUP as a

"regionally significant park." Since this draft is a management plan, it is appropriate to state that certain approvals/permits would not be necessary at this time. We look forward to receiving the consistency determination when it is ready.

Service Response: The Service will prepare consistency determinations in compliance with CAMA and 15A NCAC 07H.0207 of Chapter 7 of Title 15A of North Carolina's Administrative Code as individual projects contemplated under this CCP arise and are developed.

Comment: One of the sections of the Draft is "Regional Conservation Plans and Initiatives." This section notes that the USFWS seeks out cooperative partnerships to coordinate planning initiatives for the restoration of habitats. The Draft also recognizes the North Carolina Wildlife Resources Commission as a participating agency. We would encourage the USFWS to include the North Carolina Coastal Reserve Program as a cooperating/participating agency. This request has been made previously on our prior reviews of the other draft comprehensive conservation plans that were circulated for review and comment.

Service Response: The commenter suggests including the North Carolina Coastal Reserve Program as a cooperating/participating agency in the "Regional Conservation Plans and Initiatives" section. The USFWS accepts this suggestion and has added the Coastal Reserve Program to this section. Indeed, a representative from the Division of Coastal Management's Buckridge Coastal Reserve participated in the Mattamuskeet CCP's goals, objectives, and alternatives workshop.

Appendix F. Appropriate Use Determinations

Mattamuskeet 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: Mattamuskeet National Wildlife Refuge

Use: Animal Control

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: Signed Date: 9/8/08

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: Signed Date: 9/8/08

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Mattamuskeet National Wildlife Refuge

Use: Bicycling, Jogging, Walking, Walking Dogs, 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____ Appropriate ...X__

Refuge Manager: Signed Date: 9/19/08

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: Signed Date: 9/19/08

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Mattamuskeet National Wildlife Refuge

Use: Boating – Powerboats

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: Signed Date: [illegible]

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: Signed Date: 9/5/08

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Mattamuskeet National Wildlife Refuge

Use: Boating – Non-motorized

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: Signed Date: 9/8/08

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: Signed Date: 9/8/08

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Mattamuskeet National Wildlife Refuge

Use: Dredge or Fill

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: Signed Date: 9/4/08

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: Signed Date: 9/8/08

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Mattamuskeet National Wildlife Refuge

Use: Farming

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: Signed Date: 8/26/08

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: Signed Date: 9/3/08

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Mattamuskeet National Wildlife Refuge

Use: Fishing – 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: Signed Date: 8/26/05

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: Signed Date: 9/8/05

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Mattamuskeet National Wildlife Refuge

Use: Photography – 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: Signed Date: 8/6/08

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: Signed Date: 9/8/08

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Mattamuskeet National Wildlife Refuge

Use: Small Public Gatherings

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: Signed Date: 9/8/08

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: Signed Date: 9/8/08

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Mattamuskeet 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: Signed Date: 9/8/08

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: Signed Date: 9/8/08

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Mattamuskeet 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: Signed Date: [illegible]

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: Signed Date: 9/18/06

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

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Mattamuskeet 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: Signed Date: 8/26/08

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: Signed Date: _____

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

Appendix G. Compatibility Determinations

Mattamuskeet National Wildlife Refuge Compatibility Determinations

Uses: The following uses were found to be appropriate and were evaluated to determine their compatibility with the mission of the National Wildlife Refuge System and the purposes of the refuge:

1. Animal control
2. Bicycling, jogging, walking, walking dogs, horseback riding
3. Boating – power boats
4. Boating – nonmotorized
5. Dredge or fill
6. Environmental education – interpretation
7. Farming
8. Fishing – recreational and tournament
9. Fishing – guided
10. Hunting – big game
11. Hunting – waterfowl
12. Photography
13. Photography – commercial
14. Small public gatherings
15. Research
16. Tree harvest – firewood – other
17. Wildlife observation – guiding or outfitting

Refuge Name: Mattamuskeet National Wildlife Refuge.

Date Established: 1934.

Establishing and Acquisition Authority(ies): The United States Government acquired the land in 1934 under the authority of the National Industrial Recovery Act (48 Statute 195). Mattamuskeet NWR was established that same year under Executive Order No. 6924.

Refuge Purpose: Mattamuskeet NWR provides habitat for migratory waterfowl and other birds; provides habitat for endangered species; and provides wildlife-dependent recreation and environmental education and interpretation for the public.

The refuge is known among wildlife enthusiasts for the thousands of wintering waterfowl that it attracts each year.

National Wildlife Refuge System Mission: The mission of the Refuge 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

Public Review and Comment:
Methods used to solicit public review and comment included a Notice of Availability of the Draft CCP/EA for Mattamuskeet NWR for public review, which was published in the *Federal Register* on July 18, 2008 (73 FR 41371); notices posted at refuge headquarters and area locations; copies of the Draft CCP/EA distributed to adjacent landowners, the public, and local, state, and federal agencies; public meetings; news releases to area newspapers; and local radio announcements. The Draft CCP/EA was made available for public review and comment from July 18 to August 18, 2008. A total of 19 written comments were submitted on the Draft CCP/EA. Appendix E summarizes these comments and the Service's responses to them.

The compatibility determinations for each of the uses described and listed below were considered separately. Although for brevity, the preceding "Uses" through "Public Review and Comment" sections and the succeeding "Approval of Compatibility Determinations" section are only written once within the plan, they are part of each descriptive use and become part of that compatibility determination if considered outside of the comprehensive conservation plan.

Description of Use: *Animal Control – Nuisance Species*

This use involves the shooting or trapping of nutria, a nonnative exotic species, by volunteers or hired professionals. This activity would be managed through special use permits. Nutria are found throughout the refuge marshes, impoundments, and canals. They feed extensively on marsh vegetation and create burrows in levees and roadsides.

Availability of Resources: Based on a review of the refuge's budget allocated for this activity, adequate funding is available to ensure compatibility and to administer the 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 which depend on marsh vegetation, particularly the muskrat, a native species.

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 will be 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, levees, and roadways caused by nutria, a nonnative exotic species. Only submerged traps would be permitted and would be set in a manner to prevent accidental capture of nontarget 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 the refuge staff would have to spend conducting this activity.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-Year Re-evaluation Date: 9/19/2023

Description of Use: *Bicycling, Jogging, Walking, Walking Dogs and Horseback Riding*

This use involves bicycling, jogging, walking, walking dogs, and horseback riding on refuge roads and dikes for pleasure, wildlife observation, and wildlife photography. Foot travel is generally allowed throughout the refuge. Bicycles and horses are limited to roads and dikes (nearly all of the jogging and walking occurs on these as well).

Availability of Resources: Based on a review of the refuge's budget allocated for this activity, adequate funding is available 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.

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 (except for fishing on the State Highway 94 causeway) to daylight hours only will be maintained and enforced. Bicycles and horses will be restricted to roads and dikes.

All public access from November 2 through February 28 will be prohibited on the Farm Area Road and 22 miles of impoundment levees to prevent disturbance to wintering waterfowl. The only levees available for winter public use are: Rose Bay Levee/Canal Road, Sandy Dike Levee/Canal Road, MI-3 Levees, and the Lake Landing Levee/Canal Road (west side of the canal and east end of MI-7 impoundment).

In addition, horses are not allowed on any roads which are open to vehicles and group size is limited to 6 horses (access to use refuge roads and/or group sizes greater than 6 horses requires a special use permit.)

Justification: The roads and dikes where these uses normally occur 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.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date: 9/19/2023

Description of Use: *Boating – Powerboats*

During the period March 1 through November 1, using boats with motors (including electric motors) for fishing and wildlife observation (airboats, sailboats, jet skis, and windboards) are not authorized in refuge waters, including Lake Mattamuskeet and its associated canals.

This use includes unloading and loading boats from two government-maintained boat ramps and from various unimproved access points throughout the refuge (because Lake Mattamuskeet is shallow, averaging 2 feet in depth, only small boats can be used; these boats can easily be unloaded along many refuge roads).

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

Anticipated Impacts of the Use: Boating, during the period indicated, may cause temporary disturbance to wildlife, including nesting osprey; shore, marsh, and wading birds; and other species. Trash disposal and littering tend to be heavy at boat ramp locations. Minor disturbance to vegetation and minor erosion sometimes occurs where boats are unloaded and loaded from unimproved access points.

Determination (check one below):

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

Stipulations Necessary to Ensure Compatibility: Jet skis, airboats, and other types of purely "recreational" boats will not be authorized due to the expected unacceptable increase in disturbance to wildlife.

An active law enforcement program will strive to ensure compliance with all refuge regulations through education and enforcement activities. Law enforcement patrols in areas and at times of high fishing pressure and/or high osprey nesting activity will be conducted to minimize disturbance. Brochures will contain information on avoiding osprey disturbance and the osprey signs located at each boat ramp and around certain "at-risk" nest trees will be maintained.

The areas used to unload and load boats will continue to be monitored and limited if adverse impacts to vegetation and soil become significant.

To prevent disturbance to wintering waterfowl, all boating will be prohibited from November 2 through February 29 on Lake Mattamuskeet, the adjoining canals, and all other waters on the refuge.

Justification: Motorized boating occurring on the refuge is related almost exclusively to fishing. Sport fishing provides substantial recreational opportunities to the public and accounts for the majority of the public use on the refuge. As stated in the establishing legislation, one of the reasons the refuge was set aside may be for "fishing purposes."

A limited amount of boating occurs for wildlife observation purposes. This boating is usually in the form of canoeing but some motorized boating for this purpose may also occur. Wildlife observation is expected by the public on a wildlife refuge and usually promotes an appreciation for natural resources and support for the refuge.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-Year Re-evaluation Date: 9/19/2023

Description of Use: *Boating – Nonmotorized*

This use involves using boats without motors for fishing and/or wildlife observation in refuge waters, including Lake Mattamuskeet and its associated canals during the period March 1 through November 1. This boating is generally limited to paddle-driven boats such as canoes and kayaks (sailboats and windboards are not authorized). This use includes unloading and loading boats from two Government-maintained boat ramps and from various unimproved access points throughout the refuge.

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: Boating, during the period indicated, may cause temporary disturbance to wildlife, including nesting osprey; shore, marsh, and wading birds; and other species. Trash disposal and littering tend to be heavy at boat ramp locations. Minor disturbance to vegetation and minor erosion sometimes occurs where boats are loaded and unloaded from unimproved access points.

Most of the nonmotorized boating that occurs on the refuge is in the form of canoeing for wildlife observation or fishing, but the amount of use is nominal as compared to motorized boating. Therefore, its impacts are probably not significant.

Determination (check one below):

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

Stipulations Necessary to Ensure Compatibility: Boating will continue to be prohibited from November 2 through February 28 to minimize disturbance to wintering waterfowl using the refuge.

Sailboats, windboards, and other types of purely "recreational" boats will not be authorized due to the expected unacceptable increase in disturbance to wildlife.

Law enforcement patrols in areas and at times of high fishing pressure and high osprey nesting activity will continue to be conducted to minimize disturbance. Brochures will continue to provide information on minimizing osprey disturbance and the osprey signs located at each boat ramp and around certain "at-risk" nest trees will be maintained.

The areas used to unload and load boats will continue to be monitored and limited if adverse impacts to vegetation and soil become significant.

Justification: Nonmotorized boating occurring on the refuge is related to fishing and wildlife observation. Sportfishing provides substantial recreational opportunities to the public and accounts for the majority of the public use on the refuge. As stated in the establishing legislation, one of the reasons the refuge was set aside was for "fishing purposes."

Nonmotorized boating for wildlife observation purposes is usually in the form of canoeing. Wildlife observation is expected by the public on a wildlife refuge and usually promotes an appreciation for natural resources and support for the refuge.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date: 9/19/2023

Description of Use: *Dredge Existing Drainage Ditches*

This use involves permitting adjacent landowners to clean out existing drainage ditches crossing refuge lands. This use will be managed through individual special use permits for each clean-out request. Only existing drainage ditches may be cleaned out; the excavation cannot exceed the original depth and width of the canal, and the spoil must be placed on the existing spoil bank.

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

Anticipated Impacts of the Use: Some vegetation will be removed or destroyed by heavy equipment and deposition of spoil involved in this activity. Excavation of muck, silt, or other materials from the ditches will cause some temporary impacts on water quality in the ditch and possibly near the ditch outlet. The activity will cause some temporary disturbance or displacement of wildlife.

Determination (check one below):

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

Stipulations Necessary to Ensure Compatibility: The drainage ditch maintenance activities will be administered via the issuance of a special use permit. Only existing ditches documented on a 1934 boundary survey map will be permitted to be maintained. Ditches may not be enlarged in width or depth. Guidance from the Corps of Engineers related to the maintenance of existing ditches will apply and authorization from the Corps of Engineers must be obtained by the permittee before a special use permit will be issued. Baseline water quality monitoring will continue and should significant impacts be suspected, funding to conduct detailed monitoring

should be requested. If significant impacts are documented, efforts should be taken in concert with the appropriate state agency to correct the problem. Because drainage rights are recognized as a legal right by the court system, the refuge manager has very limited authority over this activity.

Justification: Drainage rights were in place when the refuge was established in 1934 and were recognized in a 1939 court order dissolving the former Mattamuskeet Drainage District.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date: 9/19/2023

Description of Use: *Environmental Education/Interpretation – Teaching Students, Teacher Workshops, Nonstaff-conducted Activities, and Interpretation*

This use involves environmental education to include teaching individuals (students), onsite or offsite, about refuge resources and management programs; conducting teacher workshops, onsite and offsite, to provide teachers with the knowledge and educational tools necessary to teach students about refuge resources and management programs; conducting educational activities onsite, focusing on environmental or natural resource subjects and led by teachers or other nonrefuge staff; and conducting onsite interpretation activities.

Environmental educational activities may include use of refuge structures, exhibits, roads, dikes, impoundments, and waters.

Availability of Resources: Based on a review of the refuge's budget allocated for this activity, the staff is able to conduct environmental education/interpretation activities 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 the 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.

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 Mattamuskeet 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 but 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. At a minimum, the use does not conflict with refuge purposes and generally supports them. Environmental education and interpretation are priority public uses under the National Wildlife Refuge System Improvement Act of 1997.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-Year Re-evaluation Date: 9/19/2023

Description of Use: *Farming*

This use involves farming up to 500 acres on existing cropland areas for annual production of grain (e.g., corn, soybeans, and winter wheat) and other agricultural crops using cooperative farming. A portion of the crop, 25 to 50 percent, will not be harvested by the cooperator and will serve as rental payment. The refuge's share of the crops will remain in the fields for use by wildlife. The Cropland Management Plan on file at refuge headquarters describes the proposed use in detail. Crops have been produced on the refuge since the early 1960s when nearby waterfowl impoundments were first built.

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

Anticipated Impacts of the Use: Farming operations are conducted on approximately 500 of the refuge's 50,180 acres. The impacts on biological systems within the area are extensive. Hydrology, vegetative composition, wildlife behavior (e.g., foraging, nesting, reproduction), insect life cycles; the entire ecology of the area is altered. These changes are beneficial to some species, and detrimental to others.

The production of corn in cropland areas supplies wintering waterfowl and other wildlife with a high-enerby food and, for certain species, an alternative habitat type. Agricultural crops have become an important source of energy for waterfowl in this area, especially prior to migration. Production of wheat provides waterfowl and other wildlife with green browse during the winter period. Deer and other wildlife also readily use the other crops produced (e.g., soybeans) for food and cover.

Farming operations, however, result in soil and vegetation disturbance from disking, planting, harvesting, and other mechanized activities. This also results in disturbance to wildlife. Although they are tightly regulated, certain pesticides (but no "Restricted Use" pesticides) are applied to protect crops in these areas. Because the cropland areas are within diked impoundments, release of pesticides into surrounding areas is unlikely.

The impacts of farming on biological systems and the ecology of the area are numerous, extensive, complex, and both negative and positive. Generally, the production of high-energy foods is considered essential in meeting the refuge's waterfowl management objectives and it is an integral component of the overall management program.

Determination (check one below):

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

Stipulations Necessary to Ensure Compatibility: Farming operations must be conducted in accordance with all applicable laws, regulations, and policies using biological farming techniques (including integrated pest and crop management practices) whenever possible.

Farming operations must continue to be limited to a relatively small percentage of the total refuge acreage.

Justification: The production of high-energy grain and winter green browse is considered an essential component of the waterfowl management program on the refuge. A Waterfowl Evaluation in 1989 and a Biological Review in 2002 found that the amount of available corn in and around the refuge was insufficient for wintering waterfowl. There are several reasons for this finding and many of them are still valid today. The varieties of corn planted on the refuge and in the surrounding area are early maturing (harvested in August/September) to minimize the risk of loss due to hurricanes. Waste grain from these varieties either re-sprouts or is turned under for weed control before wintering waterfowl arrive and is, therefore, unavailable to the birds. For these reasons, it is important for the refuge to provide corn to wintering migratory birds.

Using local farmers to produce this food keeps limited funds and staff available for other management priorities. Production is maximized by employing professional farmers.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date: 9/19/2023

Description of Use: *Fishing – Recreational and Tournament*

Recreational fishing (including bow fishing) for all fish and blue crabs will be allowed in accordance with state regulations. All of Lake Mattamuskeet will be available for fishing from the shoreline or boats from March 1 through November 1. During the winter, no boats will be allowed on any waters of the refuge and shoreline fishing will be restricted to the State Highway 94 causeway and the four outlet canal water control structures.

Availability of Resources: Based on a review of the refuge's budget allocated for this activity, adequate funding is available to ensure compatibility and to administer the use at its current level. To improve sportfishing opportunities, the fishing plan includes proposals for a survey of the fishery resources and water quality analyses.

Anticipated Impacts of the Use: Recreational fishing and crabbing have been occurring on the refuge since its establishment, with no apparent declines due to fishing pressure. Therefore, no adverse impacts on the fisheries resources of the refuge are expected from continuing these activities. During peak fishing periods, excessive littering, especially at boat ramps, culverts, and other popular bank fishing locations is expected. Some trampled vegetation and wildlife disturbance may also occur and fishing activities may lead to impacts from violations of refuge regulations, such as removing plants and harassing wildlife.

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 only in accordance with applicable state and federal regulations (including those that are refuge-specific).

An active law enforcement program will strive to ensure compliance with all regulations through education and enforcement activities. Law enforcement patrols in areas and at times of high fishing pressure will be conducted to minimize wildlife disturbance.

Biological data will be collected to monitor fisheries resources, water quality, and other habitat conditions.

All public access from November 2 through February 28 will be prohibited on the Farm Area Road and 22 miles of impoundment levees to prevent disturbance to wintering waterfowl. The only levees available for winter public use are: Rose Bay Levee/Canal Road, Sandy Dike Levee/Canal Road, MI-3 Levees, and the Lake Landing Levee/Canal Road (west side of the canal and east end of MI-7 impoundment).

Justification: At Mattamuskeet NWR, sportfishing and crabbing provide substantial recreational opportunities for the public and accounts for the majority of its public use. As stated in the establishing legislation, one of the reasons the refuge was set aside was for "fishing purposes." The fisheries resources have sustained high levels of public use for many years, with no apparent adverse impacts. 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 a priority public use under the National Wildlife Refuge System Improvement Act.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-Year Re-evaluation Date: 9/19/2023

Description of Use: *Fishing – Guided*

This use involves the commercial guiding of sport fishermen in refuge waters.

Availability of Resources: Based on a review of the refuge's budget allocated for this activity, adequate funding is available to ensure compatibility and to administer the use at its current level. An annual user fee of $50 will be charged for each special use permit issued.

Anticipated Impacts of the Use: Some increase in the numbers of fish legally taken can be expected when anglers unfamiliar with refuge waters use guides. However, the increase is probably modest and no significant impacts to fisheries resources are expected. Illegal take of fish may also increase (i.e., guides often become familiar with law enforcement techniques and schedules over time and may try to use this knowledge to violate regulations); however, this increase is probably also modest. No other impacts, except for those normally associated with recreational fishing, are expected from commercial sportfishing guides.

Determination (check one below):

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

Stipulations Necessary to Ensure Compatibility: Commercial guiding of sport fishermen will be authorized through special use permits, which will include any special conditions necessary to ensure that the activity is compatible with refuge purposes. All federal and state regulations governing fishing on the refuge will apply to guides and their clients as with any other recreational angler.

An active law enforcement program will strive to ensure compliance with all regulations through education and enforcement activities.

To prevent disturbance to wintering waterfowl, all boating will be prohibited from November 2 through February 29 on Lake Mattamuskeet, the adjoining canals, and all other waters on the refuge.

Justification: Allowing guides to work in refuge waters enhances the local economy (and therefore, may promote support for refuge programs); enhances safety in refuge waters; and improves the recreational experience for the clients. Biological impacts are minor and can be controlled with effective law enforcement and education.

The actual number of commercial sportfishing guides on the refuge is quite low. Generally, no more than one special use permit is requested or issued each year.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-Year Re-evaluation Date: **9/19/**2023

Description of Use: *Hunting – Big Game (White-tailed Deer)*

This use involves the hunting of big game (e.g., white-tailed deer) on approximately 9,400 acres of the refuge. Hunting will occur as two two-day hunts in October. A lottery will be used to limit hunter numbers to no more than 150 hunters per hunt. All rifles and pistols will be prohibited. Harvest will be limited to two deer per day, with no more than one legal buck per day.

Availability of Resources: Based on a review of the refuge's budget allocated for this activity, adequate funding is available to ensure compatibility and to administer the use at its current level. A user fee, currently $12.50 per hunter, will be charged and 80 percent of the funds will be retained at the refuge to be used to hire temporary personnel to help manage the hunt and hunt application process.

Anticipated Impacts of the Use: This activity is expected to result in the removal of 50 to 125 deer per year. The hunt is expected to cause temporary disturbance to nontarget wildlife in the hunt area. Some trampling of vegetation and other minor habitat disturbance may occur from hunters walking in the hunt area and using refuge roads. This may lead to some violations of refuge regulations (i.e. littering).

Determination (check one below):

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

Stipulations Necessary to Ensure Compatibility: Increased law enforcement patrols will be conducted during the deer hunt to ensure compliance with special refuge and state regulations. Biological information will be collected at the deer check-in station, and the condition of the herd health will be checked every five years by the Southeast Cooperative Wildlife Disease Study to determine the health of the refuge's deer population. Hunting will be restricted to designated areas of the refuge and limited to less than 150 hunters per hunt.

Justification: Reducing the deer herd density will lessen the damage to natural resources, agricultural crops, and optimize herd health. The establishing legislation states that a portion of the refuge may "*be reserved for use as a shooting area.*" White-tailed deer are a renewable resource, which can sustain a reasonable level of consumptive recreation. This recreational opportunity can be provided to the public without adverse effects on wildlife populations, habitats, or other refuge purposes and should promote favorable public opinion. Other aspects of the program can be used to educate the public and promote support for natural resource conservation and refuge management purposes. Hunting is a priority public use under the National Wildlife Refuge System Improvement Act.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-Year Re-evaluation Date: 9/19/2023

Description of Use: *Hunting – Waterfowl*

This use involves the hunting of waterfowl (e.g., ducks, geese, swans) and American coots on the refuge.

Hunting of resident Canada geese will be allowed in September on most of the open waters of the refuge in accordance with state seasons and other regulations. Hunting of all waterfowl during the general waterfowl hunting season will be allowed from mid-December through the end of January, 4 days per week (½ day, morning hunts) in accordance with state seasons and other regulations. In addition, a two-day youth hunt will occur in late November. Hunting during the general waterfowl season will be restricted to 20 permanent blinds along 4 miles of shoreline on the south side of Lake Mattamuskeet. A lottery system will be used to select and limit the number of hunters participating in all of the waterfowl hunts. The total number of permits issued for all of the hunts will not exceed 1,000.

Availability of Resources: Based on a review of the refuge's budget allocated for this activity, adequate funding is available to ensure compatibility and to administer this use at its current level. A user fee, currently $12.50 per hunter, will be charged and 80 percent of the funds will be retained at the refuge to be used to hire temporary personnel to help manage the hunt and the application process.

Anticipated Impacts of the Use: This use is estimated to result in the removal of approximately 500 to 1,000 birds per year from wintering waterfowl and coot populations that generally peak at between 125,000 and 225,000 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 nongame species, removing plants, and littering. Fishermen may be disturbed by hunters during the September goose hunt.

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 bird species will apply. Hunting will be allowed from designated blinds only (except for the September resident Canada goose hunt, which is allowed on most of the refuge). A maximum of 20 blinds, holding up to 3 hunters each, will be used. Hunting will be limited to mornings only (except for the September resident Canada goose hunt, which will occur all day), at a maximum of four mornings per week during the hunting season. All hunters during the youth and general waterfowl hunt will be required to attend a pre-hunt orientation. Law enforcement patrols will be conducted to help ensure compliance with applicable regulations.

Justification: The establishing legislation of the refuge states that a portion of the refuge may "be reserved for use as a shooting area." 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. The pre-hunt orientation and other aspects of the program can be used to educate the public and promote support for natural resource conservation and public programs and purposes. Hunting is one of the priority public uses of the National Wildlife Refuge System Improvement Act.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date: 9/19/2023

Description of Use: *Photography*

This use involves photographing wildlife on the refuge. This activity may involve the use of hunt blinds (when refuge hunts are not in progress) or temporary blinds. Access to the refuge for this purpose may be by vehicle, boat, bicycle, horse, or foot. Foot travel is generally allowed throughout the refuge. Bicycles and horses are limited to roads and dikes. Motorized vehicles are limited to improved roads. Boats are allowed in refuge waters during the March 1 through November 1 period only.

Availability of Resources: Based on a review of the refuge's budget allocated for this activity, adequate funding is available 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 by vehicles crossing refuge roads.

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 (except for fishing along the State Highway 94 causeway) to daylight hours only will be maintained and enforced.

To prevent disturbance to wintering waterfowl, all public access from November 2 through February 29 will be prohibited on the Farm Area Road and 22 miles of impoundment levees to prevent disturbance to wintering waterfowl. The only levees available for winter public use are: Rose Bay

Levee/Canal Road, Sandy Dike Levee/Canal Road, MI-3 Levees, and the Lake Landing Levee/Canal Road (west side of the canal and east end of MI-7 impoundment). All boating on the refuge will also be prohibited during the winter closure period.

Justification: Wildlife photography is an activity which the public generally expects to be able to participate in on a national 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 a priority public use under the National Wildlife Refuge System Improvement Act.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-Year Re-evaluation Date: 9/19/2023

Description of Use*: Photography – Commercial*

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 hunt blinds (when refuge hunts are not in progress) or temporary blinds. Access to the refuge for this purpose may be by vehicle, boat, or foot.

Availability of Resources: Based on a review of the refuge's budget allocated for this activity, adequate funding is available 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 in itself may cause some insignificant, temporary wildlife disturbance. Minor impacts to habitat and vegetation may result from installing photography blinds and related equipment.

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.

To prevent disturbance to wintering waterfowl, all public access from November 2 through February 29 will be prohibited on the Farm Area Road and 22 miles of impoundment levees to prevent disturbance to wintering waterfowl. The only levees available for winter public use are: Rose Bay Levee/Canal Road, Sandy Dike Levee/Canal Road, MI-3 Levees, and the Lake Landing Levee/Canal Road (west side of the canal and east end of MI-7 impoundment). All boating on the refuge will also be prohibited during the winter closure period.

Justification: The biological impacts of this activity by an individual or small group are minor and requests for the activity at Mattamuskeet 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 political support. Therefore, it can lead to support for refuge programs and purposes.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-Year Re-evaluation Date: 9/19/2023

Description of Use: *Small Public Gatherings*

This use primarily involves picnicking and small weddings. Picnicking occurs at various locations throughout the refuge, especially at high public use areas and associated parking lots. The refuge is rarely a destination for the sole purpose of picnicking; rather, most picnicking is associated with other public uses, including fishing, crabbing, hunting, and wildlife observation.

Weddings will only be allowed on the State Highway 94 causeway through a special use permit.

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

Anticipated Impacts of the Use: Picnicking mostly occurs at bank fishing and crabbing areas and on boats. Although some increase in littering and other violations of refuge regulations may be associated with this use, these impacts are minor.

Impacts due to weddings will be negligible as the use will be managed through special use permits to ensure that other visitors and wildlife are not negatively impacted.

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 (except for fishing along the Highway 94 causeway) to daylight hours only will be maintained and enforced. To prevent disturbance to wintering waterfowl, all public access from November 2 through February 29 will be prohibited on the Farm Area Road and 22 miles of impoundment levees to prevent disturbance to wintering waterfowl. The only levees available for winter public use are: Rose Bay Levee/Canal Road, Sandy Dike Levee/Canal Road, MI-3 Levees, and the Lake Landing Levee/Canal Road (west side of the canal and east end of MI-7 impoundment).

Weddings will be managed through special use permits. The total number of participants per event will be less than 30, the duration less than 2 hours, and timing and frequency will be managed to prevent negative impacts to other visitors and wildlife. Only the State Highway 94 causeway will be available for weddings. No more than 8 weddings will be allowed per year.

Justification: Picnicking occurs primarily in conjunction with other uses of the refuge, such as fishing 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.

Weddings are one of the most significant special events in most people's lives. A request for this event to occur on a refuge is a strong statement of a person's deep connection to a refuge and should be accommodated if it can be conducted without negatively impacting other visitors or wildlife.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date: 9/19/2023

Description of Use: *Research*

This use involves the systematic data collection activities usually conducted by nonstaff research scientists. The research is generally oriented towards discovering or verifying some fact(s) related to natural resources. The use may include collecting samples (vegetation, animals, animal products, soil, etc.), collecting measurements, and other research activities.

Availability of Resources: Based on a review of the refuge's budget allocated for this activity, adequate funding is available 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.

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.

To prevent disturbance to wintering waterfowl, all public access from November 2 through February 29 will be prohibited on the Farm Area Road and 22 miles of impoundment levees to prevent disturbance to wintering waterfowl. The only levees available for winter public use are: Rose Bay Levee/Canal Road, Sandy Dike Levee/Canal Road, MI-3 Levees, and the Lake Landing Levee/Canal Road (west side of the canal and east end of MI-7 impoundment). All boating on the refuge will also be prohibited during the winter closure period.

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.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-Year Re-evaluation Date: 9/19/ 2023

Description of Use: *Tree Harvest – Firewood – Other*

This use involves the harvesting of trees for firewood or other uses. Most trees harvested will be trees that have fallen within a road right-of-way or on a levee. Allowing this use will reduce labor by refuge staff members who otherwise would need to remove the trees. 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, adequate funding is available 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.

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 harvest 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, however, reduce refuge labor costs, as refuge staff would otherwise need to remove the trees that are having a negative impact on a refuge project, such as hindering road access.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date: 9/19/2023

Description of Use: *Wildlife Observation – Guiding or Outfitting*

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, or foot. Foot travel is generally allowed throughout the refuge. 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, adequate funding is available 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 higher or lower at the discretion of the refuge manager, depending on the revenue generated from the tours.

Anticipated Impacts of the Use: The act of observing wildlife 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. The activity will be managed through the use of special use permits, which will allow proper management of the activity.

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.

The frequency of tours to the Rose Bay Impoundments and the Lake Landing Impoundments will be limited to one tour per week per area during the winter, November 2 through February 28, to reduce disturbance to waterfowl, and to two tours per week during the remaining portion of the year. The duration of each tour in the impoundment areas shall not exceed 2 hours per tour. Tour dates must be preapproved to ensure that they do not conflict with other planned tours or events.

Justification: Wildlife observation is an activity which the public generally expects to be able to participate in on a wildlife refuge. 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 tours 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. Refuge staff and volunteers currently conduct tours, thus privately guided/outfitted tours would reduce the number of tours conducted by refuge staff which would allow them to devote more time to resource management.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement
____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date: 9/19/2023

APPROVAL OF COMPATIBILITY DETERMINATIONS

The signature of approval is for all compatibility determinations considered within the Comprehensive Conservation Plan for Mattamuskeet National Wildlife Refuge. 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: Signed 8/26/08
(Signature/Date)

Regional Compatibility Coordinator: Signed 9/11/08
(Signature/Date)

Refuge Supervisor: Signed 9/19/08
(Signature/Date)

Regional Chief, National Wildlife Refuge System, Southeast Region: Signed 9/19/08
(Signature/Date)

Appendix H. Intra-Service Section 7 Biological Evaluation

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Bruce Freske
Telephone Number: 252-926-4021
E-Mail: Bruce_Freske@fws.gov
Date: January 2008

PROJECT NAME:

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 Wildlife Resources Commission

III. Station Name: Mattamuskeet National Wildlife Refuge

IV. Description of Proposed Action
The proposed Comprehensive Conservation Plan would provide overall direction for management of wildlife populations, habitat, and public use at Mattamuskeet NWR over the next 15 years. The proposed alternative would provide for balanced wildlife/habitat management and public use activities. It would support the purposes for which the refuge was established, including conservation of threatened and endangered species.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map: Please see Figures 1, 2, and 4 of the CCP.

B. Complete the following table:

SPECIES/CRITICAL HABITAT	STATUS[1]
Red Wolf (*Canis rufus*)	E (Experimental population)
American Alligator (*Alligator mississippiensis*)	S/A

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

VI. Location (attach map): Please see Figures 1 and 2 in Chapter 2 of the CCP (Section A)

A. Ecoregion Number and Name: #34: Roanoke – Tar – Neuse – Cape Fear Ecosystem

B. County and State: Hyde County, North Carolina

C. Section, township, and range (or latitude and longitude): 35.3° N, 76.2° W

D. Distance (miles) and direction to nearest town: Approximately 5 miles east to Engelhard and 5 miles southwest to Swan Quarter.

E. Species/habitat occurrence:

Red Wolf – The Service first reintroduced the red wolf on the refuge 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 any given time. An estimated 100 wolves now inhabit a 1.7-million acre area in eastern North Carolina.

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

VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitats in item V. B:

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
Red Wolf	Impacts of proposed actions, primarily land and habitat protection, would be largely beneficial; unnecessary, or excessive disturbance of red wolf dens would be discouraged. Deer hunting could possibly lead to accidental mortality, but likely on a small scale.
American Alligator	Impacts of proposed actions, primarily land, aquatic habitat, and water quality protection, would be largely beneficial.

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

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
Red Wolf	Continuing education of the visiting public and refuge neighbors; law enforcement.
American Alligator	Continuing education of the visiting public and refuge neighbors law enforcement.

VIII. Effect Determination and Response Requested:

SPECIES/CRITICAL HABITAT	DETERMINATION[1]			REQUESTED
	NE	NA	AA	
Red Wolf		X		Concurrence
American Alligator		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 and candidate species is "Conference".

Signed 2/7/08

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):

Signed 5-7-08

Signature Date

Endangered Sp. Coord Raleigh ES

Title Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

May 7, 2008

Memorandum

To: Refuge Manager, Mattamuskeet National Wildlife Refuge, North Carolina

From: Field Supervisor, Ecological Services Office, Raleigh, North Carolina

Signed

Subject: Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) and Intra-Service Section 7 Consultation for Mattamuskeet National Wildlife Refuge

This follows review of your January 2008 Intra-Service Section 7 Biological Evaluation Form (BE Form) regarding Mattamuskeet National Wildlife Refuge's Draft CCP/EA. The Refuge is located in Hyde County, North Carolina. Per Intra-Service section 7 consultation guidelines, you have requested Field Office review of the draft documents to consider the potential impacts of the plan's implementation on federally listed threatened and endangered species. When implemented, the plan would guide Refuge operations for 15 years. Our comments are provided in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 USC 1531 *et seq.*) and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c).

The BE Form assessed the potential effects of the CCP on the red wolf (*Canis rufus*) and American alligator (*Alligator mississippiensis*). The BE Form indicates that the proposed actions outlined in the CCP's proposed alternatives would generally have a beneficial effect on red wolf habitat. The alligator would likely benefit from improved water quality anticipated in completion of proposed actions outlined in the plan.

While not discussed in the BE Form, we are aware of plant sites in Hyde County containing the federally listed, threatened, sensitive joint-vetch (*Aeschynomene virginica*). Sensitive joint-vetch records have been documented in areas of the county surrounding Lake Mattamuskeet, but, the plant has not been detected within the Refuge. We believe implementation of the CCP would generally benefit potential sensitive joint-vetch habitat on the Refuge. Therefore, we also believe efforts should be made to identify potentially suitable habitat that may exist within the Refuge and that surveys of "high-probability" areas be performed during the time of year when the species can be identified (e.g., July through October). We recommend that the Refuge keep track of dates and locations of any joint-vetch surveys conducted for use in future consultations and report any plant records discovered to this office.

Based on the information contained in the Draft CCP/EA and accompanying BE Form, we concur with your determination that implementation of the proposed plan is not likely to adversely affect the red wolf and American alligator.

The plan's implementation is not likely to adversely affect the sensitive joint-vetch or any other federally listed species or species proposed for listing under the Act.

We remind you that obligations under section 7 consultation must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered; (2) this action is subsequently modified in a manner that was not considered in this review; or, (3) a new species is listed or critical habitat determined that may be affected by the identified action.

If you have questions concerning this response please call John Hammond at (919) 856-4520, ext 28.

Appendix I. 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 preserve 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 Mattamuskeet NWR were reviewed for their suitability in meeting the criteria for wilderness, as defined by the Wilderness Act of 1964. No lands in the refuge were found to meet these criteria. Therefore, the suitability of refuge lands for wilderness designation is not further analyzed in this plan.

Specifically, with regard to the five criteria listed above:

1. The imprint of "man's work" at Mattamuskeet NWR is not "substantially unnoticeable," due to the presence of the causeway and the sight and sound of vehicles being driven on Route 94, agricultural operations, and many canals and ditches around the refuge.

2. The refuge lacks "outstanding opportunities" for solitude and "unconfined" recreation.

3. The refuge does not include 5,000 contiguous roadless acres.

4. The refuge exhibits the effects of logging, farming, grazing, and other landscape alterations.

5. Mattamuskeet NWR does have outstanding ecological, geological, and other features of scientific, educational, and historic values.

Thus, the refuge only meets one of the five wilderness criteria and would not qualify for designation by Congress to the National Wilderness Preservation System.

Appendix J. Refuge Biota

BIRDS

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

SPECIES (Common Name)	Scientific Name	SPRING	SUMMER	FALL	WINTER
Anhinga	*Anhinga anhinga*		R		R
Avocet, American	*Recurvirostra americana*		R	R	R
Bittern, American*	*Botaurus lentiginosus*	U	U	U	U
Bittern, Least*	*Ixobrychus exilis*	O	U	U	U
Blackbird, Brewer's	*Euphagus cyanocephalus*				R
Blackbird, Red-winged*	*Agelaius phoeniceus*	A	A	A	A
Blackbird, Rusty	*Euphagus carolinus*				O
Blackbird, Yellow-headed	*Xanthocephalus xanthocephalus*	R			R
Bluebird, Eastern*	*Sialia sailis*	U	U		O
Bobolink	*Dolichonyx oryzivorus*	O		O	
Bobwhite, Northern*	*Colinus virginianus*	U	U	U	U
Brant	*Branta bernicla*			R	R
Bufflehead	*Bucephala albeola*			C	C
Bunting, Indigo*	*Passerina cyanea*	U	U	U	
Bunting, Snow	*Plectrophenax nivalis*				R
Canvasback	*Aythya valisineria*			U	U
Cardinal, Northern*	*Cardinalis cardinalis*	C	C	C	C
Catbird, Gray*	*Dumetella carolinensis*	U	U	U	U
Chat, Yellow-breasted	*Icteria virens*	O		O	R
Chickadee, Carolina*	*Poecile carolinensis*	C	C	C	C
Chuck-will's Widow*	*Caprimulgus carolinensis*	U	U	U	
Coot, American	*Fulica americana*	C	O	A	C
Cormorant, Double-crested	*Phalacrocorax auritus*	C	U	C	C
Cowbird, Brown-headed*	*Molothrus ater*	C	U	U	C
Creeper, Brown	*Certhia americana*			O	O
Crow, American*	*Corvus brachyrhynchos*	C	C	C	C
Crow, Fish*	*Corvus ossifragus*	C	C	C	C

SPECIES (Common Name)	Scientific Name	SPRING	SUMMER	FALL	WINTER
Cuckoo, Black-billed	*Coccyzus erythropthalmus*	R	R	R	
Cuckoo, Yellow-billed*	*Coccyzus americanus*	U	U		
Dove, Mourning*	*Zenaida macroura*	C	C	C	C
Dowitcher, Long-billed	*Limnodromus scolopaceus*	O		U	U
Dowitcher, Short-billed	*Limnodromus griseus*	O		U	U
Duck, American Black*	*Anas rubripes*	U	O	C	C
Duck, Fulvous Whistling	*Dendrocygna bicolor*			R	R
Duck, Long-tailed	*Clangula hyemalis*			U	U
Duck, Ring-necked	*Aythya ferina*			C	C
Duck, Ruddy	*Oxyura jamaicensis*			C	C
Duck, Wood*	*Aix sponsa*	U	U	C	C
Dunlin	*Calidris alpina*	O	U	U	O
Eagle, Bald (Threatened)*	*Haliaeetus leucocephalus*	O	O	U	U
Eagle, Golden	*Aquila chrysaetos*		R	R	
Egret, Cattle	*Bubulcus ibis*		U	U	R
Egret, Great	*Ardea alba*	A	A	A	A
Egret, Snowy	*Egretta thula*	C	C	C	C
Falcon, Peregrine	*Falco peregrinus*			U	U
Finch, House	*Carpodacus mexicanus*	U		U	U
Finch, Purple	*Carpodacus purpureus*	O		O	U
Flicker, Northern*	*Colaptes auratus*	C	C	C	C
Flycatcher, Acadian	*Empidonax virescens*	U	U		
Flycatcher, Great Crested*	*Myiarchus crinitus*	U	U	O	
Gadwall	*Anas strepera*	U	O	C	C
Gannet, Northern	*Morus bassanus*			R	U
Gnatcatcher, Blue-Gray*	*Polioptila caerulea*	O	O	O	O
Godwit, Hudsonian	*Limosa* haemastica			R	
Goldeneye, Common	*Bucephala clangula*		U	U	U
Goldfinch, American	*Carduelis tristis*	U			U
Goose, Canada*	*Branta canadensis*	C	C	C	C
Goose, Greater White-fronted	*Anser albifrons*			R	R
Goose, Snow	*Chen caerulescens*			C	C
Grackle, Boat-tailed	*Quiscalus major*	U	U	U	U

SPECIES (Common Name)	Scientific Name	SPRING	SUMMER	FALL	WINTER
Grackle, Common*	*Quiscalus quiscula*	C	C	C	A
Grebe, Eared	*Podiceps nigricollis*	O			O
Grebe, Horned	*Podiceps auritus*	U			U
Grebe, Pied-billed*	*Podilymbus podiceps*	U	U	C	C
Grosbeak, Blue*	*Passerina caerulea*	U	U	U	
Grosbeak, Evening	*Coccothraustes vespertinus*				R
Gull, Bonaparte's	*Larus philadelphia*	O		U	U
Gull, Great Black-backed	*Larus marinus*	O		C	C
Gull, Herring	*Larus argentatus*	C	C	C	C
Gull, Laughing	*Larus atricilla*	C	C	C	O
Gull, Ring-billed	*Larus delawarensis*	C	C	C	C
Harrier, Northern	*Circus cyaneus*	U		C	C
Hawk, Broad-winged	*Buteo platypterus*			O	R
Hawk, Cooper's	*Accipiter cooperii*	U	U	U	U
Hawk, Red-shouldered	*Buteo lineatus*	U	U	U	U
Hawk, Red-tailed*	*Buteo jamaicensis*	U	U	C	C
Hawk, Rough-legged	*Buteo lagopus*				R
Hawk, Sharp-shinned*	*Accipiter straitus*	U	U	U	U
Heron, Black-crowned Night*	*Nycticorax nycticorax*	U	U	U	U
Heron, Great Blue*	*Ardea herodias*	A	A	A	A
Heron, Green*	*Butorides virescens*	C	C	C	
Heron, Little Blue	*Egretta caerulea*	U	U	U	U
Heron, Tri-colored	*Egretta tricolor*	U	U	U	U
Heron, Yellow-crowned Night	*Nyctanassa violacea*			R	
Hummingbird, Ruby-throated*	*Archilochus colubris*	U	U	O	R
Ibis, Glossy	*Plegadis falcinellus*	U	U	U	U
Ibis, White	*Eudocimus albus*		O	O	O
Jay, Blue*	*Cyanocitta cristata*	U	U	U	U
Junco, Dark-eyed	*Junco hyemalis*	U		U	U
Kestrel, American	*Falco sparverius*			C	C
Killdeer*	*Charadrius vociferus*	O	O	O	U
Kingbird, Eastern*	*Tyrannus tyrannus*	U	U	O	
Kingbird, Western	*Tyrannus verticalis*			R	

SPECIES (Common Name)	Scientific Name	SPRING	SUMMER	FALL	WINTER
Kingfisher, Belted	*Ceryle alcyon*	C	C	C	C
Kinglet, Golden-crowned	*Regulus satrapa*				U
Kinglet, Ruby-crowned	*Regulus calendula*	U		U	C
Knot, Red	*Calidris canutus*	O		O	
Lark, Horned	*Eremophila alpestris*			R	R
Loon, Common	*Gavia immer*			U	C
Loon, Red-throated	*Gavia stellata*			U	C
Mallard*	*Anas platyrhynchos*	U	U	C	C
Martin, Purple	*Progne subis*	U	U		
Meadowlark, Eastern*	*Stumella magna*	C	C	C	C
Merganser, Common	*Mergus merganser*			U	U
Merganser, Hooded	*Lophodytes cucullatus*			U	U
Merganser, Red-breasted	*Mergus serrator*			U	U
Merlin	*Falco columbarius*			U	U
Mockingbird, Northern*	*Mimus polyglottos*	C	C	C	C
Moorhen, Common	*Gallinula chloropus*	U	U	O	O
Nighthawk, Common	*Chordeiles minor*	U	U	U	
Nuthatch, Brown-headed*	*Sitta pusilla*	U	U	U	U
Nuthatch, Red-breasted	*Sitta canadensis*			R	R
Nuthatch, White-breasted*	*Sitta carolinensis*	U	U	R	R
Oriole, Baltimore	*Icterus galbula*			O	R
Oriole, Orchard*	*Icterus spurius*	U	U	O	
Osprey*	*Pandion haliaetus*	C	C	U	O
Ovenbird	*Seiurus aurocapilla*	U	U	U	
Owl, Barn	*Tyto alba*	O	O	O	O
Owl, Barred*	*Strix varia*	U	U	U	U
Owl, Eastern Screech*	*Megascops asio*	U	U	U	U
Owl, Great Horned*	*Bubo virginianus*	U	U	U	U
Owl, Northern Saw Whet	*Aegolius acadicus*	R	R	R	R
Oystercatcher, American	*Haematopus palliatus*		O		
Parula, Northern	*Parula americana*	U	O	U	
Pelican, American white	*Pelecanus erythrorhynchos*			R	R
Pelican, Brown	*Pelecanus occidentalis*	U	U	U	U
Phalarope, Red-necked	*Phalaropus lobatus*			R	

SPECIES (Common Name)	Scientific Name	SPRING	SUMMER	FALL	WINTER
Phoebe, Eastern	*Sayomis phoebe*	O	U	U	C
Pintail, Northern	*Anus acuta*			C	C
Pipit, American	*Anthus rubescens*			U	U
Plover, America Golden	PLUVIALIS DOMINICA	R			
Plover, Black-bellied	*Pluvialis squatarola*	U	U	U	U
Plover, Semipalmated	*Charadrius semipalmatus*	U	U	U	O
Plover, Wilson's	*Charadrius wilsonia*	U		U	O
Rail, Black	*Laterallus jamaicensis*	U	U		R
Rail, Clapper*	*Rallus longirostris*	U	U	U	U
Rail, King*	*Rallus elegans*	U	U	U	U
Rail, Virginia	*Rallus limicola*			U	U
Rail, Yellow	*Coturnicops noveboracensis*			R	R
Redhead	*Aythya americana*			U	U
Redstart, American	*Setophaga ruticilla*	U		U	
Robin, American*	*Turdus migratorius*	C	C	U	U
Sanderling	*Calidris alba*	O		O	
Sandpiper, Baird's	*Calidris bairdii*			R	R
Sandpiper, Least	*Calidris minutilla*	U		U	U
Sandpiper, Pectoral	*Calidris melanotos*	O		O	
Sandpiper, Semipalmated	*Calidris pusilla*	U	U	U	U
Sandpiper, Solitary	*Tringa solitaria*	U		U	
Sandpiper, Spotted	*Actits macularius*	U	U	U	
Sandpiper, Upland	*Bartramia longicauda*	R		R	
Sandpiper, Western	*Calidris mauri*	U	U	U	U
Sapsucker, Yellow-bellied	*Sphyrapicus varius*	U	U	U	U
Scaup, Greater	*Aythya marila*			U	U
Scaup, Lesser	*Aythya affinis*			C	C
Scoter, Black	*Melanitta nigra*			U	U
Scoter, Surf	*Melanitta perspicillata*			U	U
Scoter, White-winged	*Melanitta fusca*			O	O
Shoveler, Northern	*Anas clypeata*	O		C	C
Shrike, Loggerhead	*Lanius ludovicianus*				R
Siskin, Pine	*Carduelis pinus*				R

SPECIES (Common Name)	Scientific Name	SPRING	SUMMER	FALL	WINTER
Skimmer, Black	*Rynchops niger*	O	O	R	R
Snipe, Common	*Gallinago gallinago*	U	U	U	U
Sora	*Porzana carolina*	U		U	
Sparrow, American Tree	*Spizella arborea*			O	O
Sparrow, Chipping	*Spizella passerina*	O	O	U	U
Sparrow, Field	*Spizella pusilla*	U	U	U	U
Sparrow, Fox	*Passerella iliaca*	U		U	U
Sparrow, Grasshopper	*Ammodramus savannarum*				O
Sparrow, House*	*Passer domesticus*	U	U	U	U
Sparrow, Saltmarsh Sharp-tailed	*Ammodramus caudacutus*			O	O
Sparrow, Savannah	*Passerculus sandwichensis*	U		U	C
Sparrow, Seaside*	*Ammodramus maritimus*	U	U	U	u
Sparrow, Song	*Melospiza melodia*	U		U	C
Sparrow, Swamp	*Melospiza georgiana*	U		U	C
Sparrow, Vesper	*Pooecetes gramineus*				U
Sparrow, White-crowned	*Zonotrichia leucophrys*			U	U
Sparrow, White-throated	*Zonotrichia albicollis*	U		U	C
Starling, European*	*Stumus vulgaris*	C	C	C	C
Stilt, Black-necked	*Himantopus mexicanus*	O	O	R	
Swallow, Barn*	*Hirundo rustica*	C	C	O	
Swallow, Northern Rough-winged	*Stelgidopteryx serripennis*	U			
Swallow, Tree	*Tachycineta bicolor*	O	U	A	A
Swan, Tundra	*Cygnus columbianus*	O	R	A	A
Swift, Chimney	*Chaetura pelagica*	U	U	O	
Tanager, Scarlet	*Piranga olivacea*	R			
Tanager, Summer	*Piranga rubra*	U	U		
Teal, Green-winged	*Anas crecca*			C	C
Teal, Blue-winged	*Anas discors*	U		U	U
Tern, Black	*Chlidonias niger*			O	
Tern, Caspian	*Stema caspia*	O		O	
Tern, Common*	*Stema hirundo*	U	U	U	
Tern, Forster's*	*Stema forsteri*	U	U	U	U

SPECIES (Common Name)	Scientific Name	SPRING	SUMMER	FALL	WINTER
Tern, Gull-billed	*Stema nilotica*		O		O
Tern, Least	*Stema antillarum*		U		
Tern, Royal	*Stema maxima*	O	O	O	R
Tern, Sandwich	*Stema sandvicensis*		R		
Thrasher, Brown*	*Toxostoma rufum*	C	C	C	C
Thrush, Hermit	*Catharus guttatus*	U		U	U
Thrush, Swainson's	*Catharus ustulatus*	O		O	
Thrush, Wood*	*Hylocichla mustelina*	U	U	U	
Titmouse, Tufted*	*Baeolophus bicolor*	C	C	C	C
Towhee, Eastern*	*Pipilo erythrophthalmus*	C	C	C	C
Turkey, Wild	*Meleagris gallopavo*	O	O	O	O
Turnstone, Ruddy	*Arenaria interpres*	O		R	
Vireo, Blue-headed	*Vireo solitarius*	O		O	R
Vireo, Red-eyed*	*Vireo olivaceus*	U	U	U	
Vireo, White-eyed*	*Vireo griseus*	U	U	U	R
Vireo, Yellow-throated	*Vireo flavifrons*	O	O	O	
Vulture, Black*	*Coragyps atratus*	U	U	U	U
Vulture, Turkey*	*Cathartes aura*	C	C	C	C
Warbler, Black-and-white	*Mniotilta varia*	O		U	O
Warbler, Blackburnian	*Dendroica striata*	R			
Warbler, Blackpoll	*Dendroica fusca*	O			
Warbler, Black-throated Blue	*Dendroica caerulescens*	O	O	O	
Warbler, Black-throated Green	*Dendroica virens*	O	O		
Warbler, Canada	*Wilsonia canadensis*	R		U	R
Warbler, Cape May	*Dendroica tigrina*	R		R	
Warbler, Chestnut-sided	*Dendroica pensylvanica*	R		U	R
Warbler, Hooded*	*Wilsonia citrina*	U	U		
Warbler, Magnolia	*Dendroica magnolia*	R			
Warbler, Nashville	*Vermivora ruficapilla*				R
Warbler, Orange-crowned	*Vermivora celata*			U	U
Warbler, Palm	*Dendroica palmarum*	U		U	U
Warbler, Pine*	*Dendroica pinus*	U	U	U	U
Warbler, Prairie*	*Dendroica discolor*	U	U	R	R

SPECIES (Common Name)	Scientific Name	SPRING	SUMMER	FALL	WINTER
Warbler, Prothonotary*	*Protonotaria citrea*	U	U		
Warbler, Swainson's	*Limnothlypis swainsonii*	R	R		
Warbler, Worm-eating	*Helmitheros vermivorum*	R			
Warbler, Yellow*	*Dendroica petechia*	O	O	R	R
Warbler, Yellow-rumped	*Dendroica coronata*	C		C	C
Warbler, Yellow-throated*	*Dendroica dominica*	U	U	O	
Waterthrush, Northern	*Seiurus noveboracensis*	O		O	
Waxwing, Cedar	*Bombycilla cedrorum*	U		U	U
Whimbrel	*Numenius phaeopus*	O		O	
Whip-poor-will	*Caprimulgus vociferus*		U	U	
Wigeon, American	*Anas americana*	U		C	C
Wigeon, Eurasian	*Anas penelope*			O	O
Willet*	*Catoptrophorus semipalmatus*	U	U	O	O
Wood Pewee, Eastern*	*Contopus virens*	U	U	U	O
Woodcock, American	*Scolopax minor*	O	O	U	C
Woodpecker, Downy*	*Picoides pubescens*	U	U	U	U
Woodpecker, Hairy*	*Picoides villosus*	U	U	U	U
Woodpecker, Pileated*	*Dryocopus pileatus*	U	U	U	U
Woodpecker, Red-bellied*	*Melanerpes carolinus*	C	C	C	C
Woodpecker, Red-headed*	*Melanerpes erythrocephalus*	O	O	O	O
Wren, Carolina*	*Thryothorus ludovicianus*	C	C	C	C
Wren, House*	*Throglodytes aedon*	U	U	U	U
Wren, Marsh*	*Cistothorus palustris*	U	U	U	U
Wren, Sedge	*Cistothorus platensis*			U	U
Wren, Winter	*Troglodytes troglodytes*			U	U
Yellowlegs, Greater	*Tringa melanoleuca*	O	O	U	U
Yellowlegs, Lesser	*Tringa flavipes*	U	O	U	O
Yellow-throat, Common*	*Geothlypis trichas*	C	C	C	C

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*

Common Name	Scientific Name
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*

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*

Common Name	Scientific Name
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*
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*

Common Name	Scientific Name
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 sipedon williamengelsi*

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*

Common Name	Scientific Name
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*

Common Name	Scientific Name
Perch, Silver	*Bairdiella chrysoura*
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*

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 K. Budget Requests

REFUGE OPERATING NEEDS SYSTEM (RONS)

Tier I Mattamuskeet

Station Rank/ Tier	Project Number	Cost (First Year, Recurring)	Positions	Project Title
1/1	97009	$377K ($333K/$44K)	0	Control Invasive Phragmites and Alligator Weed
2/1	00005	$118K ($106K/$12K)	0	Conduct Biological and Aquatic Study of Lake Mattamuskeet

MATTAMUSKEET TIER I

Project: 97009
First Year Request: $333,000, Recurring Request: $44,000
Station Rank – 1 (Mattamuskeet Tier 1)
Enhance wetland habitat for waterfowl and other migratory birds by controlling two invasive plant species: Phragmites and Alligator Weed. These two invasive plants readily out compete desirable wetland plant species, resulting in degraded habitat that is less attractive to migratory birds. An existing herbicide treatment program for Phragmites needs to be expanded by 25 per cent. Also, to reduce the program's dependence on toxic chemicals, a mechanical treatment option needs to be implemented. A specialized marsh vehicle (with a hydraulic-driven mower or a roller chopper head) is needed to mechanically control Phragmites in the marsh areas of Lake Mattamuskeet. Herbicide chemicals are also needed to treat Alligator Weed. The project includes a storage building (approved for herbicide and toxic chemicals) to comply with current safety and environmental standards.

Project: 00005
First Year Request: $106,000, Recurring Request: $12,000
Station Rank – 2 (Mattamuskeet Tier 1)

Conduct a study of fish communities, aquatic organisms, and water quality in the 40,000-acre Lake Mattamuskeet, North Carolina's largest natural lake. The 50,180-acre refuge winters 125,000 to 200,000 birds annually, mostly waterfowl, including about 30 percent of the Atlantic population of tundra swans. These migratory birds are very dependent on the refuge lake and surrounding habitats. This study will assess the health of the lake's fishery, document the status of other aquatic organisms, and analyze water quality (salinity, dissolved oxygen, pollutants, toxins). The shallow nature of Lake Mattamuskeet, and the recent shift in local agricultural practices to cotton farming (which requires a significant use of pesticides), warrants this study. The purpose of the study is to collect essential data needed to assess and monitor the health of this significant lake basin and to identify any existing and potential impacts to refuge wildlife and habitat.

Tier II - Mattamuskeet

Station Rank/ Tier	Project Number	Cost (First Year, Recurring)	Positions	Project Title
1/2	97004	$301K ($290K/$11K)	0	Improve Moist Soil Management
2/2	97003	$133K ($65K/$68K)	1	Improve Water Management on Lake Mattamuskeet and 11 Impoundments
3/2	00003	$38K ($30K/$8K)	0	Increase Law Enforcement Capabilities and Public Safety
4/2	97002	$160K ($150K/$10K)	0	Conduct Four Biological Studies to Improve Management Techniques
5/2	00006	$95K ($90K/$5K)	0	Conduct Waterfowl Food Studies on Three National Wildlife Refuges
6/2	97023	$133K ($65K/$68K)	1	Enhance Environmental Education and Outreach Programs
7/2	97028	$192K ($192K/$0)	0	Develop Conceptual Site and Exhibit Plans
8/2	00007	$50K ($50K/$0)	0	Acquire High Resolution Aerial Photographs for Three National Wildlife Refuges
9/2	99005	$76.5K ($47.5K/$29K)	0.5	Improve Management and Protection of Farm Service Agency Easements
10/2	00017	$100K ($100K/$0)	0	Conduct a Cultural Resource Survey

MATTAMUSKEET - TIER 2

Project: 97004
First Year Request: $290,000, Recurring Request: $11,000
Station Rank – 1 (Mattamuskeet Tier 2)
Improve management capabilities for 2,100 acres of moist soil units. This will be achieved by purchasing equipment to properly manage the units and constructing a pumping station at MI-9. Equipment needs include an offset disc and excavator for moist soil management. Supplies for the MI-9 pumping station include a 30" low-lift pump, a diesel motor power unit, and materials needed to fabricate the pump station and shed. Mattamuskeet NWR has 9 impoundments (2,100 ac) managed as moist soil units to provide habitat for waterfowl, shorebirds and other wildlife. These moist soil areas comprise only 5% of the refuge's land base, but account for a significant proportion of waterfowl use. Mattamuskeet is one of the most important wintering areas for waterfowl along the Atlantic Flyway, especially for northern pintails and tundra swans.

Project: 97003
First Year Request: $65,000, Recurring Request: $68,000
Station Rank – 2 (Mattamuskeet Tier 2)

Improve water level manipulation capabilities of Lake Mattamuskeet (40,000 ac) and 11 managed impoundments (2,648 ac). Some impoundments are not properly managed each year due to time and staff restraints. The addition of a biological technician position will increase management capabilities and maximize the benefits of the lake and impoundments. Proper water level management is crucial to the production of plants that provide food and cover to sustain waterfowl and other migratory birds during the winter and migration periods. This position will monitor water levels, operate and maintain pumps, regulate water control structures and maintain dikes. This complexity of wetlands provides feeding and resting habitat for 125,000-175,000 wintering waterfowl each year, as well as other migratory birds and resident wildlife. Mattamuskeet Refuge is one of the largest over wintering areas for northern pintails and tundra swans in the Atlantic Flyway.

Project: 00003
First Year Request: $30,000, Recurring Request: $8,000
Station Rank – 3 (Mattamuskeet Tier 2)
Improve law enforcement capabilities to protect wildlife, facilities and visitor safety. Current law enforcement equipment is not sufficient to deal with problems that occur on the refuge. New supplies will be purchased to provide the law enforcement staff with equipment that will increase officer safety and the effectiveness of their activities. Equipment such as night vision scopes, surveillance cameras, field test kits for drugs and alcohol, lockers, etc. will be used to document violations. The lockers are needed to properly secure evidence, abandoned property, and law enforcement equipment.

Project: 97002
First Year Request: $150,000, Recurring Request: $10,000
Station Rank – 4 (Mattamuskeet Tier 2)
Conduct four biological research studies to improve resource management on all three refuges (Mattamuskeet/Cedar Island/Swanquarter). The studies are 1) analyzing specific needs and use patterns of declining Neotropical birds on all three refuges; 2) analyze the effects of aluminum flap gates and experimental fish weirs, installed in water control structures, to permit the passage of fish into the lake. This could lead to recommendations for improvements to benefit anadromous fishes; 3) analyze water quality, particularly its impacts on fish, vegetation, and waterfowl; 4) evaluate the effects of fire in marsh habitats on plants and wildlife. Results of the studies will be used to determine management practices that will benefit habitat quality and wildlife. Funding will be used to contract with universities or other research entities to conduct the studies and make management recommendations**.**

Project: 00006
First Year Request: $90,000, Recurring Request: $5,000
Station Rank – 5 (Mattamuskeet Tier 2)
Conduct a food habitats study for wintering waterfowl on Mattamuskeet, Swanquarter and Cedar Island NWRs. This study will analyze the food habitats in natural and managed wetlands. A current understanding of waterfowl food habitats on the wintering grounds is critically needed to make wise habitat management and restoration decisions. The existing information on waterfowl habitats is several decades old and in need of updating. Equipment is available, but a temporary technician and a contractor to identify food items is needed to conduct this study.

Project: 97023
First Year Request: $65,000, Recurring Request: $68,000
Station Rank – 6 (Mattamuskeet Tier 2)

Increase environmental education, outreach and public use programs by the addition of an environmental education specialist position. This position will coordinate and expand ongoing educational activities with the Partnership for the Sounds, East Carolina University and other environmental and educational groups. Environmental programs and workshops will be presented at the Mattamuskeet Lodge and off-refuge locations. Off site exhibits, outreach videos, and informational leaflets will be developed and presented to the public in various ways. News releases highlighting refuge and ecological events will be made available to media on a regular basis. Filling this position will help to get the message of the Service, refuge and ecosystem out to the public.

Project: 97028
First Year Request: $192,000, Recurring Request: $0
Station Rank – 7 (Mattamuskeet Tier 2)
Develop concept plans for future interpretive facilities and visitor center exhibits. The plans will locate appropriate sites for trails, boardwalks, observation areas and other interpretive facilities. The types of interpretive facilities needed will be addressed. The scope and types of future visitor center exhibits will be developed. The plan will provide information and details needed to develop future public use facilities and provide adequate cost estimates for planning purposes.

Project: 00007
First Year Request: $50,000, Recurring Request: $0
Station Rank – 8 (Mattamuskeet Tier 2)
Acquire a complete updated set of high resolution aerial photographs for Mattamuskeet, Swanquarter and Cedar Island NWRs. The photographs are needed to assess habitat types for management decision-making purposes. The maps will help in tracking invasive plant species and monitoring the effectiveness of various treatments to eradicate and control their spread. The current conventional sources of photographs are outdated and have limited value for reference.

Project: 99005
First Year Request: $47,500 Recurring Request: $29,000
Station Rank – 9 (Mattamuskeet Tier 2)
Improve protection and management of Farm Service Agency easements. Mattamuskeet is assigned the responsibility to manage 14 FSA easements located on private lands. The easements, totaling 623 acres, are scattered throughout 7 counties. The refuge has a legal mandate to protect the easements. Annual inspects need to be made to ensure compliance by the landowners. Habitat work can also be done to improve to easements for wildlife. The easements do not receive the attention they need, due to other refuge priorities and limited staff. This project will hire a part-time biological technician to write a habitat management plan for each easement, conduct annual compliance checks, and implement management to improve wildlife habitat. The easements are considered part of the National Wildlife Refuge System.

Project: 00017
First Year Request: $100,000 Recurring Request: $0
Station Rank – 10 (Mattamuskeet Tier 2)
Conduct a comprehensive cultural resource survey and literature and background search on Mattamuskeet NWR. A limited survey and search was done in 1978. This survey only concentrated on development sites. The original survey report suggested that 460 acres of the refuge contained possible prehistoric sites and recommended additional surveys. An intensive survey is needed to complete the cultural resource inventory. The work will be contracted out. This information is needed to protect areas of significant cultural importance.

MAINTENANCE MANAGEMENT SYSTEM NEEDS

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
99103054		Replace the existing oil/paint storage building.	42530	10041804	COMP	DM	DMRP	JOHNSONS
2.01E+09	98103062	40190 Rehabilitate Central Canal ENG Child of 98103062	42530	10016369	COMP	DM	DMEG	ZAZADOST
2.01E+09		Bridge Repairs 10016312	42530	10016312	COMP	DM	DMCM	MCCAINBE
2.01E+09		KRW - E4AA Purchase storm shutters	42530	10016328	COMP	DM	DMCM	MOOREDON
2.01E+09		KRW - E4AA Purchase generator for shop	42530	10016325	COMP	DM	DMCM	MOOREDON
2.01E+09		KRW - E4AA Purchase generator for office	42530	10016324	COMP	DM	DMCM	MOOREDON
2.01E+09		KRW - E4AA Purchase storm shutters	42530	10016329	COMP	DM	DMCM	MOOREDON
2.01E+09		KRW - E4AA Purchase storm shutters	42530	10016326	COMP	DM	DMCM	MOOREDON
2.01E+09		KRW - E4AA Purchase storm shutters	42530	10016327	COMP	DM	DMCM	MOOREDON
103063	2.01E+09	Rehabilitate the West Main Canal.	42530	10016368	INPRG	DM	DMFP	LANAHANB
103064	2.01E+09	Rehabilitate East Main Canal	42530	10016367	INPRG	DM	DMFP	LANAHANB
103060	2.01E+09	Replace the Rose Bay boat ramp. Access to current	42530	10016383	INPRG	DM	DMFP	LANAHANB

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
98103062	2.01E+09	Rehabilitate Central Canal. The canal has silted	42530	10016369	INPRG	DM	DMFP	LANAHANB
3124783	2.01E+09	Replace deteriorating equipment storage	42530	10016424	INPRG	DM	DMFP	JOHNSONS
3124785	2.01E+09	Replace the 40 year old shop/maintenance building.	42530	10016325	INPRG	DM	DMFP	JOHNSONS
90110137	2.01E+09	Rehabilitate Outfall Canal and adjoining canals at	42530	10016379	INPRG	DM	DMFP	JOHNSONS
2.01E+09	103064	Rehabilitate East Main Canal DM child of 00103064	42530	10016367	INPRG	DM	DMRH	JOHNSONS
2.01E+09	103063	Rehabilitate West Main Canal DM child of 00103063	42530	10016368	INPRG	DM	DMRH	JOHNSONS
2.01E+09	103063	Rehabilitate West Main Canal ENG child of 00103063	42530	10016368	INPRG	DM	DMEG	JOHNSONS
2.01E+09	103064	Rehabilitate East Main Canal ENG child of 00103064	42530	10016367	INPRG	DM	DMEG	JOHNSONS
2.01E+09	90110137	Rehabilitate Outfall Canal and adjoining canals at refuge headquarters. ENG child of 90110137	42530	10016379	INPRG	DM	DMEG	JOHNSONS
2.01E+09	98103062	Rehabilitate Central Canal DM Child of 98103062	42530	10016369	INPRG	DM	DMRH	JOHNSONS
2.01E+09	3124785	Replace shop building DM child of 03124785	42530	10016325	INPRG	DM	DMRP	JOHNSONS

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09	3124783	Replace deteriorating equipment storag DM child of 03124783	42530	10016424	INPRG	DM		JOHNSONS
2.01E+09	3124783	Replace deteriorating equipment storag CI child of 03124783	42530	10016424	INPRG	DM		JOHNSONS
2.01E+09	3124783	Replace deteriorating equipment storag ENG child of 03124783	42530	10016424	INPRG	DM		JOHNSONS
2.01E+09	90110137	Rehabilitate Outfall Canal	42530	10016379	INPRG	DM	DMCM	JOHNSONS
2.01E+09	103060	Replace Rose Bay Boat Ramp DM child of 00103060	42530	10016383	INPRG	DM	DMRP	JOHNSONS
99133096		Construction & Construction Engineering. Planning	42530		WAPPR	DM		CLARKTHA
4135012		Replace the Highway 94 public boat ramp. This pub	42530	10016438	WAPPR	DM	DMFP	JOHNSONS
99103072		Preliminary Engineering. Planning and design to re	42530	10016314	WAPPR	DM	DMRH	HAMEETMT
80133093		Construction & Construction Engineering. Planning	42530		WAPPR	DM		JOHNSONS
94103050	2.01E+09	Rehabilitate the dikes around MI-10. The dike's s	42530	10016363	WAPPR	DM	DMFP	QUINTANK
80103069		Preliminary Engineering. Planning and design to re	42530	10016448	WAPPR	DM		CLARKTHA

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
99103071		REHAB FHWA RTE WAUPOPPIN CANAL ROAD	42530	10016349	WAPPR	DM		CLARKTHA
99103055		Preliminary Engineering. Planning and design for	42530	10016414	WAPPR	DM		CLARKTHA
103059		Rehabilitate MI-11 rim canal. The canal is approx	42530	10016386	WAPPR	DM	DMFP	JOHNSONS
98103045	2.01E+09	Replace grain storage bin, constructed in 1967. T	42530	10016439	WAPPR	DM	DMFP	JOHNSONS
80103053	2.01E+09	Replace the deteriorated equipment wash facility b	42530	10041799	WAPPR	DM	DMFP	LANAHANB
122122	2.01E+09	Repair Refuge Quarters Road. The road is bumpy an	42530	10016448	WAPPR	DM	DMFP	LANAHANB
99122116		REHAB FHWA RTE FARM AREA ROAD	42530	10016314	WAPPR	DM		CLARKTHA
99122117		Construction. Planning and design to reshape and r	42530		WAPPR	DM		CLARKTHA
4136214		Repair public use parking areas along Wildlife Drive	42530	10016446	WAPPR	DM		MITCCARL
4136220		REHAB FHWA RTE 150 LAKE LANDING ROAD	42530	10040933	WAPPR	DM		CLARKTHA
4136509		The Federal Highway Administration, under authorit	42530	10016441	WAPPR	DM	DMFP	LABEDANI

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
4136099		REHAB FHWA RTE 130 SANDY DIKE ROAD	42530	10016447	WAPPR	DM		CLARKTHA
4136158		Repair public use parking areas located on and nea	42530	10016447	WAPPR	DM		CAUDILLP
4136088		REHAB FHWA RTE 020 WILDLIFE DRIVE	42530	10016446	WAPPR	DM		CLARKTHA
4136074		REHAB FHWA RTE 140 ROSE BAY CANAL ROAD	42530	10016347	WAPPR	DM		CLARKTHA
4136180		Repair public use parking areas (FHA Rt. #905 & 90	42530	10041952	WAPPR	DM		WYRICKCH
4136171		Repair the parking areas (FHA Rt. # 900, 901, 902)	42530	10041952	WAPPR	DM		WYRICKCH
4136079		REPAIR FHWA RTE 110 CENTRAL CANAL ROAD	42530	10016350	WAPPR	DM		CLARKTHA
2.01E+09	2.01E+09	Rehabilitate MI-11 Rim Canal DM child of 00103059	42530	10016386	WAPPR	DM	DMRH	JOHNSONS
2.01E+09	103059	Rehabilitate MI-11 Rim Canal ENG child of 00103059	42530	10016386	WAPPR	DM	DMEG	JOHNSONS
2.01E+09		Repair Refuge Ouarters Road DM child of 00122122	42530	10016448	WAPPR	DM	DMRH	JOHNSONS
2.01E+09	122122	Repair Refuge Ouarters Road ENG child of 00122122	42530	10016448	WAPPR	DM	DMEG	LABEDANI

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09	4136509	Rehabilitate West Main Canal Bridge ENG child of 04136509	42530	10016441	WAPPR	DM	DMEG	LABEDANI
2.01E+09	2.01E+09	Replace water lines	42530	10041745	WAPPR	DM	DMRP	JOHNSONS
2.01E+09	4135012	Replace Highway 94 Boat Ramp DM Child of 04135012	42530	10016438	WAPPR	DM	DMRP	JOHNSONS
2.01E+09	94103050	Rehabilitate the dikes around MI-10 ENG Child of 94103050	42530	10016363	WAPPR	DM	DMEG	QUINTANK
2.01E+09	98103045	Replace grain storage bin ENG child of 98103045	42530	10016439	WAPPR	DM	DMEG	WHEELERJ
2.01E+09	80103053	Replace equipment wash building ENG child of 80103053	42530	10041799	WAPPR	DM	DMEG	WHEELERJ
2.01E+09		Replace grain storage bin DM child of 98103045	42530	10016439	WAPPR	DM	DMRP	JOHNSONS
2.01E+09	80103069	resurface the deteriorating asphalt pavement road by the refuge headquarters. ENG child of 80103069	42530	10016448	WAPPR	DM	DMEG	HAMEETMT
2.01E+09	2.01E+09	R4 Mattamuskeet Entrance Road Bridge Rte 10 (Child)	42530	10016414	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	2.01E+09	RRP R4 FY 08 Mattamuskeet Roads And Parking Lots	42530		WAPPR	DM		CLARKTHA
2.01E+09	2.01E+09	R4 Mattamuskeet #1 East Canal Bridge Rte 20 (Parent)	42530		WAPPR	DM	DMFP	CLARKTHA

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09	2.01E+09	R4 Mattamuskeet #1 East Canal Bridge Rte 20 (Child)	42530	10016345	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	2.01E+09	R4 Mattamuskeet East Canal Bridge (Parent)	42530	10016345	WAPPR	DM	DMFP	QUINTANK
2.01E+09	2.01E+09	R4 Mattamuskeet East Canal Bridge (Child)	42530	10016345	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	2.01E+09	RRP R4 FY 10 Mattamuskeet Roads And Parking Lots	42530		WAPPR	DM		CLARKJO
2.01E+09	2.01E+09	R4 Mattamuskeet Entrance Road Bridge Rte 10 (Child)	42530	10016414	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	2.01E+09	R4 Mattamuskeet Entrance Road Bridge Rte 10 (Parent)	42530		WAPPR	DM	DMFP	FURNISSS
2.01E+09	99133096	reshape and regravel the Farm Area Road (Rte 160) and adjacent parking lots (Rtes 940, 941). DM Child of 99133096	42530		WAPPR	DM		CLARKTHA
2.01E+09	4136171	Repair Rtes 900, 901, 902 ENG Child of 04136171	42530	10041952	WAPPR	DM	DMEG	WYRICKCH
2.01E+09	2.01E+09	R4 Mattamuskeet Entrance Road Bridge Rte 10 (Parent)	42530		WAPPR	DM	DMFP	CLARKJO
2.01E+09	99103072	Preliminary Engineering. Planning and design to reshape and regravel the Farm Area Road (Rte 160) ENG Child of 99103072	42530	10016314	WAPPR	DM	DMEG	CLARKTHA

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09	4136099	Repair Rte 130 DM Child of 04136099	42530	10016447	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	4136099	Repair Rte 130 ENG Child of 04136099	42530	10016447	WAPPR	DM	DMEG	WYRICKCH
2.01E+09	4136180	Repair Rtes 905, 906 DM Child of 04136180	42530	10041952	WAPPR	DM	DMRH	CLARKJO
2.01E+09	4136180	Repair Rtes 905, 906 ENG Child of 04136180	42530	10041952	WAPPR	DM	DMEG	WYRICKCH
2.01E+09	4136079	Repair Rte 110 DM Child of 04136079	42530	10016350	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	99103072	Preliminary Engineering. Planning and design to reshape and regravel the Farm Area Road (Rte 160) DM Child of 99103072	42530	10016314	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	4136074	Repair Rte 140 DM Child of 04136074	42530	10016347	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	4136079	Repair Rte 110 ENG Child of 04136079	42530	10016350	WAPPR	DM	DMEG	WYRICKCH
2.01E+09	4136074	Repair Rte 140 ENG Child of 04136074	42530	10016347	WAPPR	DM	DMEG	WYRICKCH
2.01E+09	4136088	Repair Rte 020 DM Child of 04136088	42530	10016446	WAPPR	DM	DMRH	CLARKJO
2.01E+09	99103055	Preliminary Engineering. Planning and design for the replacement of the Entrance Road Bridge. ENG Child of 99102055	42530	10016414	WAPPR	DM	DMEG	CLARKTHA

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09	99103071	Preliminary Engineering. Planning and design to reshape and regravel. DM Child of 99103071	42530	10016349	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	4136088	Repair Rte 020 ENG Child of 04136088	42530	10016446	WAPPR	DM	DMEG	WYRICKCH
2.01E+09	4136214	Repair Wildlife Drive ENG child of 04136214	42530	10016446	WAPPR	DM	DMEG	MITCCARL
2.01E+09	4136220	Repair public parking areas DM child of 04136220	42530	10040933	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	4136158	Rehab Parking Sandy Dike Rd. ENG child of 04136158	42530	10016447	WAPPR	DM	DMEG	CAUDILLP
2.01E+09	99122116	regravel the Farm Area Road (Rte 160) and adjacent parking lots (Rtes 940, 941 ENG Child of 99122116	42530	10016314	WAPPR	DM	DMEG	CLARKTHA
2.01E+09	4136220	Repair public parking areas ENG child of 04136220	42530	10040933	WAPPR	DM	DMEG	MITCCARL
5138029	2.01E+09	Replace the aged and worn out metal storage buildi	42530	10016311	WAPPR	DM	DMFP	QUINTANK
5138233		Replace the removed flap gate lifting devises for	42530	10016313	WAPPR	DM		JOHNSONS
5137952		Replace aged and worn out concrete block office/vi	42530	10016324	WAPPR	DM	DMFP	LANAHANB

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09	2.01E+09	Rehab Entrance Road Bridge Rte 10	42530	10016414	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	2.01E+09	R4 Mattamuskeet East Canal Bridge (Child)	42530	10016345	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	5137952	Replace aged and worn out concrete block office DM Child of 05137952	42530	10016324	WAPPR	DM	DMRP	MCCAINBE
2.01E+09	5137952	Replace aged and worn out concrete block office ENG Child of 05137952	42530	10016324	WAPPR	DM	DMEG	JOHNSONS
2.01E+09	2.01E+09	Replace worn residence for Law Enforcement Officer	42530	10016328	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Replace deteriorating metal storage building	42530	10016391	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Replace broken above ground fuel tanks	42530	10016452	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Replace worn residence for Assistant Refuge Manager	42530	10016327	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Bridge Repairs 10016342	42530	10016342	WAPPR	DM	DMCM	JOHNSONS
2.01E+09	2.01E+09	Bridge Repairs 10016346	42530	10016346	WAPPR	DM	DMCM	CLARKJO
2.01E+09	2.01E+09	Bridge Repairs 10016384	42530	10016384	WAPPR	DM	DMCM	CLARKJO
2.01E+09		Bridge Repairs 10016362	42530	10016362	WAPPR	DM	DMCM	MCCAINBE

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09		Bridge Repairs 10016429	42530	10016429	WAPPR	DM	DMCM	MCCAINBE
2.01E+09		Bridge Repairs 10016414	42530	10016414	WAPPR	DM	DMCM	MCCAINBE
2.01E+09	2.01E+09	Bridge Repairs 10016441	42530	10016441	WAPPR	DM	DMCM	ZAZADOST
2.01E+09		REHAB FHWA RTE 900 WILDLIFE VIEWING PULL-OUT PARKING	42530	10040940	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB HQ LOOP ROAD	42530	10040904	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 901 & 902 BOAT LAUCH PARKING AREA	42530	10042028	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		Bridge Repairs 10016361	42530	10016361	WAPPR	DM	DMCM	MCCAINBE
2.01E+09		REHAB FHWA RTE 903 FISH DECK PARKING AREA	42530	10040982	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 904 HQ PARKING AREA	42530	10040994	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 905 HQ PARKING AREA	42530	10040998	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 906 HQ/BOAT RAMP PARKING	42530	10041008	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 909 NEM HOLLAND TRAILHEAD PARKING	42530	10041043	WAPPR	DM	DMRH	CLARKTHA

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09		REHAB FHWA RTE 910 WILDLIFE VIEWING #12 PARKING	42530	10041047	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 927,928,929,930, WILDLIFE VIEWING PARKING AREA	42530	10041487	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 908 FISHING DECK PARKING AREA	42530	10041029	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 931 SR 94 BOAT RAMP PARKING	42530	10041310	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 934 CULVERT #2 PARKING AREA	42530	10041319	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 940 LAKE LANDING PARKING AREA	42530	10016432	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 941 WAUPOPPIN CANEL PARKING	42530	10016430	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 942 WILDLIFE VIEWNG PARKING AREA	42530	10041358	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 943 NEW HOLLAND TRAILHEAD PARKING	42530	10041359	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB REFUGE HQ ROAD	42530	10016340	WAPPR	DM	DMRH	CLARKJO
2.01E+09		REHAB FHWA RTE WILDLIFE VIEWING #11 PARKING AREA	42530	10041050	WAPPR	DM	DMRH	CLARKTHA

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09		REHAB FHWA RTE 924 DUCK BLIND PARKING	42530	10041254	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 935 CULVERT #3 PARKING AREA	42530	10041323	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 936 CULVERT #4 PARKING AREA	42530	10041349	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 937 CULVERT #5 PARKING AREA	42530	10041353	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 938 BOAT LAUNCH PARKING AREA	42530	10016431	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 939 WILDLIFE VIEWING PARKING AREA	42530	10041357	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 926 FISHING ACCESS PARKING	42530	10041265	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 932 CULVERT #1 PARKING AREA	42530	10041313	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 933 CULVERT #2 PARKING AREA	42530	10041317	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 916,917,918,919,920,921,922,925 WILDLIFE VIEWING #1-7 PARKING	42530	10041475	WAPPR	DM	DMRH	CLARKTHA

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09		REHAB FHWA RTE 923 WILDLIFE VIEWING #8 PARKING AREA	42530	10041250	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 912 WILDLIFE VIEWING #10 PARKING	42530	10041443	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		REHAB FHWA RTE 913,914,915 #1 CANAL WILDLIFE VIEWING PARKING	42530	10041458	WAPPR	DM	DMRH	CLARKTHA
2.01E+09	2.01E+09	Repair Levees Dikes	42530	10016363	WAPPR	DM	DMCM	CLARKJO
2.01E+09		REHAB FHWA RTE 919 WILDLIFE VIEWING #4	42530	10041177	WAPPR	DM	DMRH	CLARKTHA
2.01E+09		Rehab FHWA Route 907	42530	10041020	WAPPR	DM	DMRH	CLARKJO
2.01E+09	2.01E+09	Repair Levees Dikes	42530	10016395	WAPPR	DM	DMCM	CLARKJO
2.01E+09	2.01E+09	Repair Levees Dikes	42530	10016354	WAPPR	DM	DMCM	CLARKJO
2.01E+09	2.01E+09	Dredge Canal	42530	10016370	WAPPR	DM	DMCM	CLARKJO
2.01E+09	2.01E+09	Dredge Canal	42530	10016371	WAPPR	DM	DMCM	CLARKJO
2.01E+09	2.01E+09	Repair Levees Dikes	42530	10016352	WAPPR	DM	DMCM	JOHNSONS
2.01E+09	2.01E+09	Repair Levees Dikes	42530	10016396	WAPPR	DM	DMCM	JOHNSONS
2.01E+09	2.01E+09	Dredge Ditch	42530	10041706	WAPPR	DM	DMCM	CLARKJO

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09	2.01E+09	Dredge Ditch	42530	10041696	WAPPR	DM	DMCM	CLARKJO
2.01E+09	2.01E+09	Dredge Canal	42530	10016417	WAPPR	DM	DMCM	CLARKJO
2.01E+09	2.01E+09	Dredge Canal	42530	10016387	WAPPR	DM	DMCM	CLARKJO
2.01E+09	2.01E+09	Repair Levees Dikes	42530	10016364	WAPPR	DM	DMCM	CLARKJO
2.01E+09	2.01E+09	Dredge Canal	42530	10016380	WAPPR	DM	DMCM	ZAZADOST
2.01E+09	2.01E+09	Dredge Canal	42530	10016319	WAPPR	DM	DMCM	CLARKJO
2.01E+09	2.01E+09	Rehabiliate worn MI-10 bridge which crosses the MI-10 rim canal.	42530	10016384	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehabilitate silted Sandy Dike Canal.	42530	10016387	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehabilitate silted MI-11 canal.	42530	10016386	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehabilitate silted MI-1 rim canal.	42530	10016370	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehabilitate silted MI-2 rim canal.	42530	10016371	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehabilitate silted MI-9 interior Canal.	42530	10016417	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehabilitate silted canal.	42530	10016319	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehabilitate silted MI-10 rim canal.	42530	10016380	WAPPR	DM	DMFP	LANAHANB

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09	2.01E+09	Replace worn Refuge residence water lines.	42530	10041745	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Repair rotting Quarters #40 residence	42530	10016326	WAPPR	DM	DMRH	JOHNSONS
2.01E+09	2.01E+09	Rehabilitate worn levee.	42530	10016363	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Repair damaged guardrail on side of West Main Canal Bridge.	42530	10016441	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehabilitate worn MI-8 levee.	42530	10016396	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Replace deteriorating metal storage building	42530	10016391	WAPPR	DM	DMRP	JOHNSONS
2.01E+09		Repair broken above ground fuel tanks DM child of 2006407479	42530	10016452	WAPPR	DM	DMRH	KEVINCAR
2.01E+09		Replace equipment wash building DM child of 80103053	42530	10041799	WAPPR	DM	DMRP	KEVINCAR
2.01E+09		Rehabilitate the marsh impoundment (MI) #2 pumping station and reshape the MI #1 and #2 dikes.DM child of 93103049	42530	10016344	WAPPR	DM	DMRP	KEVINCAR
2.01E+09		Rehabilitate the dikes around MI-10 DM Child of 94103050	42530	10016363	WAPPR	DM	DMRH	QUINTANK
2.01E+09		Repair Rose Bay Boat Ramp	42530	10016383	WAPPR	DM	DMRP	KEVINCAR

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09	2.01E+09	Rehabilitate silted-in internal ditches in Refuge impoundments.	42530	10041706	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehabilitate worn levee.	42530	10016354	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Repair rotting Quarters #43 residence	42530	10016329	WAPPR	DM	DMRH	JOHNSONS
2.01E+09	2.01E+09	Rehabilitate worn levee.	42530	10016364	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehabilitate worn MI-9 levee.	42530	10016395	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehabilitate damaged wood bridge which crosses Lake Landing Canal.	42530	10016346	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehabilitate silted-in ditches in Refuge agricultural fields.	42530	10041696	WAPPR	DM	DMFP	LANAHANB
2.01E+09		Repair weathered Old West Main Canal trail bridge	42530	10016366	WAPPR	DM	DMRH	KEVINCAR
2.01E+09		Repair deteriorated FA-2 water control structure	42530	10016405	WAPPR	DM	DMCM	KEVINCAR
2.01E+09	2.01E+09	Repair eroded MI-2 levee	42530	10016422	WAPPR	DM	DMCM	JOHNSONS
2.01E+09		Repair severely damaged mobile home	42530	10041891	WAPPR	DM	DMRH	KEVINCAR
2.01E+09	2.01E+09	Rehabilitate the eroded MI-2 impoundment levee.	42530	10016352	WAPPR	DM	DMFP	LANAHANB

WONUM	PARENT	DESCRIPTION	LOCATION	EQNUM	STATUS	WORK TYPE	SUBWORK TYPE	CHANGE BY
2.01E+09	2.01E+09	Repair eroded MI-2 levee	42530	10016422	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Repair rotting Quarters #40 residence	42530	10016326	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Repair rotting Quarters #43 residence	42530	10016329	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Repair the worn Wildlife Drive Bridge (bridge # 42530-00057) that spans Central Canal.	42530	10016342	WAPPR	DM	DMFP	LANAHANB
2.01E+09	2.01E+09	Rehab Entrance Rd Bridge and East Canal Bridge Rte 10 and 20 (PE)	42530	10016345	WAPPR	DM		CLARKTHA

Appendix L. Consultation and Coordination

This appendix summarizes the consultation and coordination that occurred in identifying the issues, alternatives, and proposed alternative, which are presented in this CCP. It lists the meetings that were held with the various agencies, organizations, and individuals who were consulted in the preparation of the CCP.

A series of public scoping meetings was held on February 15, 16, 20, 22, and 23, 2001. There was substantial public participation at these meetings and during scoping in general.

The Service conducted a biological review in July 2002 for all the national wildlife refuges (including Mattamuskeet NWR) in the Roanoke-Tar-Neuse-Cape Fear Ecosystem of northeastern North Carolina and southeastern Virginia. A diverse team of federal, state, university, and nongovernmental biologists undertook a holistic examination of habitat and wildlife management programs at the refuges. The biological review participants and agencies represented included:

- the Service's Southeast Regional Office (Atlanta) Nongame Migratory Bird Coordinator;
- the Service's Southeast Regional Office Forester;
- a representative from the Center for Conservation Biology at the College of William and Mary;
- the Chief of the Service's Division of Migratory Birds, Southeast Regional Office;
- several biologists from the North Carolina Wildlife Resources Commission;
- a North Carolina State University biologist;
- a forester with USFWS;
- a representative of the Coastal Program, Raleigh, North Carolina;
- The Nature Conservancy;
- National Park Service, Cape Hatteras National Seashore;
- False Cape State Park;
- A private forester from Roanoke Rapids, North Carolina;
- North Carolina Forest Service, New Bern, North Carolina;
- The refuge manager, forester, and wildlife biologist from Great Dismal Swamp NWR in Virginia; and
- multiple staff from the Service's North Carolina national wildlife refuges, including Alligator River, Roanoke River, Mackay Island, Pocosin Lakes, and Backbay Island.

A visitor services review was also conducted in December 2006 by the Service's public use and outreach specialists at the Southeast Regional Office and two other refuges in Region 4.

Public scoping was reinitiated in June 2007 after the CCP process was temporarily halted. A public scoping meeting advertised in the local news media was held at the Mattamuskeet Senior Center on June 20, 2007. The comments received from this 2007 public scoping meeting, as well as those from the initial 2001 scoping meetings, are summarized in Appendix E.

A two-day workshop was held on September 25–26, 2007, to develop a vision, goals, and objectives for the refuge. The workshop participants and organizations represented included:

- USFWS Division of Migratory Birds, Supervisory Wildlife Biologist;
- NCWRC, Outer Banks Center for Wildlife Education;
- NCWRC, District Fisheries Biologist;

- NCWRC, Waterfowl Biologist;
- The Nature Conservancy;
- NCDCM, Buckridge Coastal Reserve;
- East Carolina University;
- North Carolina Cooperative Extensive Service, Swan Quarter;
- Partnership for the Sounds; and
- a consulting biologist and conservation planner from a private contractor (Mangi Environmental Group).

The Draft CCP/EA for Mattamuskeet National Wildlife Refuge was then completed and made available for public review and comment from July 18 to August 18, 2008. A total of 19 comment letters were received. These public comments and the Service's responses to them are summarized in Appendix E.

Appendix M. List of Preparers

Bruce Freske, U.S. Fish and Wildlife Service, Mattamuskeet National Wildlife Refuge

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Jeff DeBlieu, The Nature Conservancy

Roger Rulifson, East Carolina University

Mac Gibbs, North Carolina Cooperative Extensive Service, Swan Quarter

Tom Stroud, Partnership for the Sounds

Appendix N. Finding of No Significant Impact

INTRODUCTION

The U.S. Fish and Wildlife Service (Service) proposes to protect and manage certain fish and wildlife resources on Mattamuskeet National Wildlife Refuge in Hyde County, North Carolina. An Environmental Assessment has been prepared to inform the public of the possible environmental consequences of implementing the Comprehensive Conservation Plan for Mattamuskeet National Wildlife Refuge. A description of the alternatives, the rationale for selecting the preferred alternative, the environmental effects of the preferred alternative, the potential adverse effects of the action, and a declaration concerning the factors determining the significance of effects, in compliance with the National Environmental Policy Act of 1969, are outlined below. The supporting information can be found in the Environmental Assessment, Section B of the Draft Comprehensive Conservation Plan.

ALTERNATIVES

In developing the Comprehensive Conservation Plan for Mattamuskeet National Wildlife Refuge, the Service evaluated three alternatives. The Service selected Alternative B, the preferred alternative, as the comprehensive conservation plan for guiding the direction of the refuge for the next 15 years. The overriding concern reflected in this plan is that wildlife conservation assumes first priority in refuge management; wildlife-dependent recreational uses are allowed if they are compatible with wildlife conservation. Wildlife-dependent recreation uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) will be emphasized and encouraged.

ALTERNATIVE A: NO ACTION ALTERNATIVE

Alternative A represented the status quo, that is, no change from current management. Under this alternative, the refuge would continue to furnish habitat and sanctuary during the fall and winter for 20–30 percent of North Carolina's tundra swans; 40,000–60,000 northern pintails and American green-winged teal; 5,000 Canada geese (Atlantic Population); and 40,000–60,000 other ducks, including 2,000–4,000 black ducks. Management of resident wildlife and fish in collaboration with partners would continue, including winter counts of bald eagles; Christmas bird counts; reptile and amphibian studies; and the red wolf recovery program.

Under Alternative A, the refuge's existing habitats would also be maintained, including 40,276 acres of open water; 2,300 acres of freshwater marsh; 2,000 acres in 12 moist soil units; 572 acres of three forested impoundments; 1,300 acres of mixed pine hardwood; 1,000 acres of wet pine flatwoods; 266 acres of nonimpounded cypress gum swamp; 191 acres of corn and soybean cropland; and 189 acres in the Conservation Reserve Program (CRP). Refuge resources would be protected by limiting the negative impacts of human activity and invasive species on and around the refuge.

A range of visitor services without the guidance of an overall visitor services plan would continue for all six priority public uses, including deer and waterfowl hunting, fishing, environmental education, interpretation, wildlife observation and photography. By 2010, a new refuge headquarters/visitor contact station and a new maintenance workshop would be constructed, while replacing two staff houses.

ALTERNATIVE B: PREFERRED ALTERNATIVE

Alternative B, the refuge's preferred alternative, enhances or slightly expands various aspects of Alternative A. For wintering waterfowl under Alternative B, the objectives for tundra swans and northern pintails are the same, but the Canada goose objective is 5,000 higher and the duck objective is 40,000 to 60,000 higher. Alternative B would replicate most elements and expand upon other aspects of Alternative A's fisheries management.

Alternative B would also expand Alternative A's management of raptors, passerine birds, shorebirds, marsh and wading birds, mammals, and reptiles and amphibians. It would reinitiate nest counts of ospreys, ground surveys for marsh and wading birds, and implement passerine point counts. Furthermore, the refuge would evaluate alternative management strategies for moist soil units as to their benefit for shorebird spring and fall migrations.

Alternative B expands on Alternative A's habitat objectives. It would investigate the desirability and feasibility of restoring the Salyer's Ridge pinewoods and consider new management options for the CRP cropland. Alternative B would expand resource protection by increasing control of invasive plant and animal species such as common reed, alligatorweed, and nutria. The refuge would also prepare and begin to implement a Cultural Resources Management Plan. To enhance law enforcement, the refuge would obtain one full-time equivalent (FTE) law enforcement officer dedicated solely to the Mattamuskeet Refuge.

To better support public use, under Alternative B, the refuge would prepare and implement a Visitor Services Plan. Existing hunts would continue and the refuge would explore how to increase youth hunting opportunities for deer and waterfowl and cooperate with the North Carolina Wildlife Resources Commission (NCWRC) to conduct activities promoting hunter recruitment and retention. Fishing opportunities would increase by adding one boat ramp to support an additional 5,000 angler visits annually. Nature Week would be reinstituted and the refuge would begin to host ten K-12 school programs annually. Interpretation opportunities would be expanded by adding kiosks, annually revised brochures, and interpretive signage along the wildlife drive and New Holland boardwalk trail. Opening and staffing the visitor contact station with volunteer(s) on weekends would also promote further interpretation. Alternative B would reinstall an eight-mile canoe and kayak loop trail and construct one additional photoblind. Like Alternative A, the refuge would cooperate with partners to encourage commercial ecotours. The refuge would also increase its outreach efforts.

ALTERNATIVE C: MODERATELY EXPANDED PROGRAM

Alternative C represented a moderate expansion over the refuge's existing program; it was also somewhat more expansive than Alternative B, the Service's preferred alternative. For wintering waterfowl under Alternative C, the objectives for tundra swans and northern pintails were the same as Alternative B, but the Canada goose objective is 5,000 higher and the duck objective 80,000 to 120,000 higher. Alternative C would aim for the same objectives as Alternative B in other aspects of wildlife and fisheries management. However, Alternative C generally proposed more studies and surveys than Alternative B.

Alternative C's habitat management objectives were identical to Alternative B's and quite similar to Alternative A's. Alternative C would replicate Alternative B's resource protection objectives, but in addition, would install and maintain one or more remote automated water quality monitoring devices/stations and further increase control of invasive species, including monitoring for the presence of kudzu and feral swine.

Alternative C provided increased visitor services over those offered by the first two alternatives, and increases in each of the six priority public uses. Like Alternative B, visitor services would be under the guidance of a Visitor Services Plan. A Park Ranger would annually offer 30 interpretive programs, including offering or hosting interpreted kayak excursions. The refuge would further expand outreach by increasing its off-refuge programs, news releases, and website updates.

SELECTION RATIONALE

The Service selected Alternative B as its preferred alternative. This choice is reflected in the comprehensive conservation plan. While each of the alternatives offered benefits for wildlife, habitat, and public use, Alternative B was more ambitious than Alternative A and more feasible and realistic than Alternative C.

ENVIRONMENTAL EFFECTS

Implementation of the Service's management action is expected to result in biophysical, social, and economic effects as outlined in the comprehensive conservation plan. Habitat management, population management, land conservation, and visitor service management activities on Mattamuskeet National Wildlife Refuge would result in mostly beneficial impacts on habitat, wildlife, and public use. These effects are detailed as follows:

Wintering waterfowl populations are likely to increase somewhat under this alternative, although Canada geese, northern pintails, and green-winged teal are expected to remain unchanged. Fish species composition and population densities in both Lake Mattamuskeet and the canals that drain it would probably be similar over the 15-year planning period, though increases in crappie are anticipated due to increased spawning habitat provided by canal dredging. However, long-term declines in aquatic habitat for both fish and waterfowl would be expected to continue as the lake becomes more eutrophic and gradually fills in with inorganic sediments and organic matter. Dredging of canals will help reduce the amount of sediment annually deposited in the lake but will not reverse the long-term trend of eutrophication.

Blue crab harvest would not change; likewise, no change is anticipated other aquatic invertebrates. As well, growing use of the refuge by bald eagles, ospreys, and other raptors is expected to continue. The occurrence of passerine birds would probably not change, because no changes in their habitat are proposed. However, improved information from a greater effort at surveying could potentially lead to changed management strategies that may be beneficial.

Shorebirds would continue to use one moist soil unit in the spring; any change in their numbers would be due to external factors. Shorebird numbers may increase during the fall migration if one moist soil unit is managed to attract them. No change in the distribution or density of marsh and wading birds is likely. Current management would produce no change in the population size or distribution of mammals, including white-tailed deer and the recovering red wolf. Finally, no changes are expected in the refuge's reptile and amphibian populations.

With regard to habitats, the main change likely to occur under Alternative B is the long-term, gradual decrease in open water habitat on Lake Mattamuskeet mentioned above. Current management strives to maintain 40,276 acres of open water habitat in Lake Mattamuskeet, but the long-term trend of loss of open water in the lake will surely continue as sediments and organic matter accumulate over time. The quantity and quality of marsh would remain essentially the same over a 15-year period, although the loss of open water just discussed over time would probably be compensated by a gain in the area of marsh, at least temporarily. Over this same timeframe, there would likely be little

effect on freshwater marsh from sea level rise associated with global warming, which would probably amount to an inch or two at most.

With regard to the effects of proposed management on other refuge habitats, the quality of moist soil units and the managed forested impoundments would improve but quantity of habitat would be unchanged. Quality would improve through more intensive management to reduce noxious weeds and increase food plants important to waterfowl. There would be little change in the acreage and composition of forested habitats over most of the refuge; normal forest maturation and succession would continue in these forests, barring wildfire, which would set back succession. However, improved management of the Salyer's Ridge pinewoods would be beneficial to that forest stand and its value as wildlife habitat. If the same crops and rotations were used, the area and composition of cropland on the refuge would be unchanged, as would be the food and foraging benefits it furnishes to wildlife. However, if upon consideration of other management options, the refuge staff decided to implement one or more of them (such as scrub/shrub habitat or early successional habitat similar to moist soil units), a wide variety of birds and mammals would likely benefit while some ducks and geese would be deprived of some "hot food."

With respect to resource protection, the same quantity of land and habitat would continue to be protected, with minor possible increases because of property purchases at strategic locations within an approved acquisition boundary. More comprehensive water quality monitoring on Lake Mattamuskeet would be more likely to reveal hidden water quality or contaminant problems if they exist. Nevertheless, no change in water quality is likely to occur under this alternative. However, if monitoring discovers a problem, the refuge and the NCWRC could begin to work toward a solution. It seems likely that feral swine will become established on the refuge in the near future, and the CCP would provide for a proactive approach to address this threat.

Known cultural resources on the refuge would continue to be protected. Although some looting and theft of these resources would be expected to continue, this problem would be reduced because of stepped-up law enforcement. In addition, the proposed cultural resources survey and Cultural Resources Management Plan would, over time, increase the refuge staff's knowledge and appreciation of extant cultural and historic resources on the refuge. Although Mattamuskeet Lodge is no longer part of the refuge, the Service would continue to cooperate with the state and the Partnership for the Sounds. An increased level of law enforcement would provide improved protection for the public—neighbors and visitors alike—and the refuge's natural and cultural resources.

The invasive common reed would continue to infest marshes but would likely be curbed due to increased control using annual herbicide applications and mowing. The invasive nutria would also continue to infest the refuge, displacing native wildlife and damaging some infrastructure. Increased control measures are likely to reduce the populations of this rodent and the damage it causes, but are not going to eradicate this pest.

Alternative B would modestly increase existing hunting and fishing opportunities, which would benefit these two user groups. Current levels of environmental education, interpretation, and outreach would also be increased under this alternative, which would benefit the public and conservation knowledge in general. Opportunities for wildlife observation and photography would be enhanced, making the refuge more attractive to the general visitor. Ecotourism would be encouraged to a greater extent. Planned new facilities, in particular the office and visitor contact station, would improve staff effectiveness, as well as the visitor experience.

By continuing to protect wildlife habitat and maintain water quality, stepping up management of wetlands and conservation of wildlife populations, and augmenting sustainable wildlife-dependent recreation, this alternative would continue to be consistent with the Coastal Zone Management Act and North Carolina's Coastal Area Management Act.

POTENTIAL ADVERSE EFFECTS AND MITIGATION MEASURES

WILDLIFE DISTURBANCE

Disturbance to wildlife at some level is an unavoidable consequence of any public use program, regardless of the activity involved. Obviously, some activities innately have the potential to be more disturbing than others. The management actions to be implemented have been carefully planned to avoid unacceptable levels of impact.

As currently proposed, the known and anticipated levels of disturbance of the management action are considered minimal and well within the tolerance level of known wildlife species and populations present in the area. Implementation of the public use program would take place through carefully controlled time and space zoning, establishment of protection zones around key sites, and routing of roads and trails to avoid direct contact with sensitive areas, such as nesting bird habitat, etc. All hunting activities (season lengths, bag limits, number of hunters) would be conducted within the constraints of sound biological principles and refuge-specific regulations established to restrict illegal or nonconforming activities. Monitoring activities through wildlife inventories and assessments of public use levels and activities would be utilized, and public use programs would be adjusted as needed to limit disturbance.

USER GROUP CONFLICTS

As public use levels expand across time, some conflicts between user groups may occur. Programs would be adjusted, as needed, to eliminate or minimize these problems and provide quality wildlife-dependent recreational opportunities. Experience has proven that time and space zonings, such as establishment of separate use areas, use periods, and restricting numbers of users, are effective tools in eliminating conflicts between user groups.

EFFECTS ON ADJACENT LANDOWNERS

Occasional, inadvertent flooding of certain adjacent properties would continue when Lake Mattamuskeet levels are high. There is little the refuge can do to prevent this. Canals would no longer be allowed to silt in and lose capacity; their rehabilitation (restoring design capacity and configuration) would be pursued on the four outlet canals and rim canals and annual maintenance increased.

Future land acquisition would occur on a willing-seller basis only, at fair market values within the approved acquisition boundary. Lands are acquired through a combination of fee title purchases and/or donations and less-than-fee title interests (e.g., conservation easements, cooperative agreements) from willing sellers. Funds for the acquisition of lands within an approved acquisition boundary would likely come from the Land and Water Conservation Fund or the Migratory Bird Conservation Act. The management action contains neither provisions nor proposals to pursue off-refuge stream bank riparian zone protection measures (e.g., fencing) other than on a volunteer/partnership basis.

LAND OWNERSHIP AND SITE DEVELOPMENT

Proposed acquisition efforts by the Service would result in changes in land and recreational use patterns, since all uses on national wildlife refuges must meet compatibility standards. Land ownership by the Service also precludes any future economic development by the private sector. Potential development of access roads, dikes, control structures, and visitor parking areas could lead to minor short-term negative impacts on plants, soil, and some wildlife species. When site development activities are proposed, each activity will be given the appropriate National Environmental Policy Act consideration during pre-construction planning. At that time, any required mitigation activities will be incorporated into the specific project to reduce the level of impacts to the human environment and to protect fish and wildlife and their habitats.

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

The management action is not expected to have significant adverse effects on wetlands and floodplains, pursuant to Executive Orders 11990 and 11988.

COORDINATION

The management action has been thoroughly coordinated with all interested and/or affected parties. Parties contacted include:

- All affected landowners
- Congressional representatives
- Governor of North Carolina
- North Carolina Wildlife Resources Commission
- North Carolina Division of Coastal Management
- North Carolina State Historic Preservation Officer
- Local community officials
- Interested citizens
- Conservation organizations

FINDINGS

It is my determination that the management action does not constitute a major federal action significantly affecting the quality of the human environment under the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969, as amended. As such, an environmental impact statement is not required. This determination is based on the following factors (40 C.F.R. 1508.27), as addressed in the Environmental Assessment for Mattamuskeet National Wildlife Refuge:

1. Both beneficial and adverse effects have been considered and this action will not have a significant effect on the human environment (Environmental Assessment, pages 105-151).

2. The actions will not have a significant effect on public health and safety (Environmental Assessment, page 129).

3. The project will not significantly affect any unique characteristics of the geographic area such as proximity to historical or cultural resources, wild and scenic rivers, or ecologically critical areas (Environmental Assessment, page 141).

4. The effects on the quality of the human environment are not likely to be highly controversial (Environmental Assessment, page 131).

5. The actions do not involve highly uncertain, unique, or unknown environmental risks to the human environment (Environmental Assessment, pages 139-143).

6. The actions will not establish a precedent for future actions with significant effects nor do they represent a decision in principle about a future consideration (Environmental Assessment, page 135-137).

7. There will be no cumulatively significant impacts on the environment. Cumulative impacts have been analyzed with consideration of other similar activities on adjacent lands, in past action, and in foreseeable future actions (Environmental Assessment, pages 137-148).

8. The actions will not significantly affect any site listed in, or eligible for listing in, the National Register of Historic Places, nor will they cause loss or destruction of significant scientific, cultural, or historic resources (Environmental Assessment, pages 128-129, 132).

9. The actions are not likely to adversely affect threatened or endangered species, or their habitats (Environmental Assessment, page 146).

10. The actions will not lead to a violation of federal, state, or local laws imposed for the protection of the environment (Environmental Assessment, pages 129, 133).

SUPPORTING REFERENCES

U.S. Fish and Wildlife Service. 2008. Draft Comprehensive Conservation Plan and Environmental Assessment for Mattamuskeet National Wildlife Refuge, Hyde County, North Carolina. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region, Atlanta, Georgia.

DOCUMENT AVAILABILITY

The Environmental Assessment was Section B of the Draft Comprehensive Conservation Plan for Mattamuskeet National Wildlife Refuge and was made available in July 2008. Additional copies are available by writing: Mattamuskeet National Wildlife Refuge, 33 Mattamuskeet Road, Swanquarter, NC 27885.

Signed

Sam D. Hamilton
Regional Director

9/19/08

Date