U.S. Fish & Wildlife Service

Eastern Neck National Wildlife Refuge

Comprehensive Conservation Plan

March 2010

Front cover:

Waterfowl on Hail Creek
Terry Willis

Northern diamondback terrapin
Ryan Haggerty/USFWS

Bald eagle
Steve Hillebrand/USFWS

Tundra swans
©Heather R. Davidson

Monarch butterfly
USFWS

Back cover:

Waterfowl on Hail Creek
Terry Willis

This blue goose, designed by J.N. "Ding" Darling, has become the symbol of the National Wildlife Refuge System.

The *U.S. Fish and Wildlife Service* is the principal Federal agency responsible for conserving, protecting, and enhancing fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The Service manages the 150-million acre National Wildlife Refuge System comprised of more than 550 national wildlife refuges and thousands of waterfowl production areas. It also operates 70 national fish hatcheries and 81 ecological services field stations. The agency enforces Federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the Federal Assistance Program which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state wildlife agencies.

Comprehensive Conservation Plans provide long term guidance for management decisions and set forth goals, objectives, and strategies needed to accomplish refuge purposes and identify the 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.

U.S. Fish & Wildlife Service

Eastern Neck National Wildlfe Refuge

Comprehensive Conservation Plan
March 2010

Submitted by:

Suzanne Baird
Project Leader
Chesapeake Marshlands National Wildlife Refuge Complex

3/5/2010
Date

Concurrence by:

Daryle Lons
Refuge Supervisor, South
National Wildlife Refuge System

3/10/10
Date

Anthony D. Legér
Assistant Regional Director
National Wildlife Refuge System

3-19-10
Date 3-24-2010

Approved by:

Acting
Marvin E. Moriarty
Regional Director, Region 5

3/21/10
Date

Eastern Neck National Wildlife Refuge

Comprehensive Conservation Plan

March 2010

Abstract

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Responsible official: Marvin Moriarty, Regional Director, Region 5

For further information:

Project Leader
Chesapeake Marshlands National Wildlife Refuge Complex
2145 Key Wallace Drive
Cambridge, MD 21613
Phone: 410/228-2692
FAX: 410/228-3261
Email: fw5rw_bwnwr@fws.gov
Web: www.fws.gov/northeast/easternneck

This Comprehensive Conservation Plan (CCP) for the 2,286 acre Eastern Neck National Wildlife Refuge is the culmination of a planning effort involving several Maryland state agencies, local partners, refuge neighbors, private landowners, Friends of Eastern Neck, and the local community. This CCP establishes 15-year management goals and objectives for wildlife and habitats, public use, and administration and facilities.

Under this plan, we make improvements to our biological and public use programs. We prioritize our management activities for wildlife and habitats and the visitor services we provide in order to be more effective and efficient with our resources. We will improve our outreach and visibility on the refuge and in nearby communities through new or enhanced partnerships. We will also continue to work hard with our land conservation partners to help identify and protect valuable wildlife habitats. Finally, we will employ an adaptive management approach that includes adjusting our activities as results from management actions become better understood. This flexibility is especially important as we face ecological uncertainties, such as the predicted impacts of climate change.

U.S. Fish & Wildlife Service

Eastern Neck National Wildlife Refuge

Comprehensive Conservation Plan

Refuge Vision Statement

Eastern Neck National Wildlife Refuge will sustain diverse and healthy aquatic, tidal marsh, and uplands habitats to support robust populations of Federal trust species and remain an essential link in the network of conserved lands in the Chesapeake Bay. Our successes will be supported by the strong partnerships we develop with other Federal agencies, State agencies, conservation organizations, land managers, and neighboring communities. Working with those partners will provide the opportunity to showcase and demonstrate a science-based, adaptive management approach, with emphasis on the protection and restoration of shoreline and tidal marsh.

We will continue to reward all who visit with an opportunity to immerse themselves in the natural sights and sounds of the Chesapeake Bay. The thrill of observing more than 100,000 migrating and wintering waterfowl moving in and out of the refuge each year, including the rare tundra swan, is an experience that forms a lasting impression about the wonders of nature. Visitors will also be delighted by the refuge's healthy populations of bald eagles and ospreys as they dive for fish and attend to their young. They will also enjoy the opportunity to observe the phenomenon of over 100 species of birds migrating through each fall. We will enhance these and other refuge experiences by providing exceptional interpretive and visitor programs about the Chesapeake Bay and its rich diversity of natural and cultural resources.

We hope residents of neighboring communities on the Delmarva Peninsula will value the refuge for enhancing their quality of life. Within the National Wildlife Refuge System, the refuge will be treasured for conserving the Chesapeake Bay's Federal trust resources and providing inspirational outdoor experiences for present and future generations of Americans.

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Chapter 1

Robert Pos/USFWS

Horseshoe crab

Purpose of and Need For Action

Introduction

Eastern Neck National Wildlife Refuge (refuge, NWR) is a 2,286-acre island in Kent County, Maryland. Established in 1962, its purposes are to provide long-term protection for unique wetlands, threatened and endangered species and migratory birds of conservation concern, and to sustain regionally significant concentrations of wildlife. Forty percent of the refuge consists of brackish tidal[1] marsh and tidal ponds. The remaining 60 percent includes upland forest, croplands managed for wildlife, grasslands, shrub/brush lands, freshwater ponds and moist soil units. Since 2005, the refuge has been managed as part of the Chesapeake Marshlands National Wildlife Refuge Complex (CM Refuge Complex) which includes the Blackwater Refuge, with its Barren Island, Watts Island, Bishops Head, Spring Island and Garrett Island divisions, and Martin, Susquehanna, and Eastern Neck national wildlife refuges (map 1.1).

This Comprehensive Conservation Plan (CCP) for the refuge was prepared pursuant to the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd–668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act) (Public Law 105-57; 111 Stat. 1253). An environmental assessment (EA), required by the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.; 83 Stat. 852), was prepared concurrent with the draft CCP. The decision to adopt this plan and its "Finding of No Significant Impact" are included as appendix I.

This document presents the combination of management goals, objectives and strategies that will guide management decisions and actions on the refuge over the next 15 years. It also helps the State of Maryland natural resource agencies, our conservation partners, local communities, and the public understand our priorities and work with us to achieve common goals.

This CCP has five chapters and nine appendixes. Chapter 1 explains the purpose of and need for preparing a CCP, and sets the stage for four subsequent chapters and the appendixes. Chapter 1 also:

- defines the refuge's regional context and planning analysis area,
- presents the mission, policies and mandates affecting the development of the plan,
- identifies other conservation plans we used as references; and,
- clarifies the vision and goals that drive refuge management.

Chapter 2, "The Comprehensive Conservation Planning Process," describes the planning process we followed, including public and partner involvement, in the course of developing this final plan.

Chapter 3, "Refuge and Resource Descriptions," describes the refuge's regional and local setting, physical attributes, habitats, species and other natural resources, and human-created environment of roads, trails, croplands, impoundments, and buildings.

[1] The state of Maryland has jurisdiction for activities in tidal waters below the mean high tide. In this document, when we refer to Service ownership, or describe refuge management actions in tidal waters, we generally mean those areas above mean high tide.

Map 1.1. Eastern Neck Refuge Location in the Chesapeake Marshlands Refuge Complex

Chapter 4, "Management Direction and Implementation," presents the general refuge management actions, and the goals, objectives and strategies that will guide decision-making and land management. It also outlines our staffing and funding needs to accomplish the management direction.

Chapter 5, "Consultation and Coordination with Others," summarizes how we involved the public and our partners in the planning process. Their involvement is vital for the future management of this refuge and for helping us to evaluate the plan's effectiveness.

Nine appendixes, a Glossary and Bibliography provide additional supporting documentation and references. The nine appendixes are:

- Appendix A: Species of Conservation Concern at Eastern Neck Refuge
- Appendix B: Findings of Appropriateness and Compatibility Determinations
- Appendix C: Refuge Operations Needs System (RONS) and Service Asset Maintenance Management System (SAMMS)
- Appendix D: Refuge Staffing Chart
- Appendix E: Fire Management Program Guidance
- Appendix F: Intra-Service Endangered Species Act (Section 7) Compliance
- Appendix G: National Historic Preservation Act Compliance
- Appendix H: Summary and Response to Public Comments
- Appendix I: Finding of No Significant Impact (FONSI)

The Purpose of and Need for this CCP

The *purpose of* this CCP is to provide strategic management direction to meet the goals detailed in the section below titled "Refuge Goals." This CCP also best achieves the refuge purpose and vision; contributes to the missions of the Service and National Wildlife Refuge System (Refuge System); adheres to Service policies and other mandates, addresses significant issues; and, incorporates sound principles of fish and wildlife science. The 1997 Refuge Improvement Act requires us to prepare a CCP for every national wildlife refuge to help fulfill the mission of the Refuge System.

CCPs support that mission by

- stating clearly the desired future conditions for refuge habitat, wildlife, visitor services, staffing, and facilities;
- explaining clearly to state agencies, refuge neighbors, visitors, and partners the reasons for our management actions;
- ensuring that our management of the refuge conforms to the policies and goals of the Refuge System and is consistent with legal mandates;
- ensuring that present and future public uses are compatible with the purposes of the refuge;
- providing long-term continuity and direction in refuge management; and,

- justifying budget requests for staffing, operating and maintenance funds.

There are several reasons we identified a *need* to develop a CCP for this refuge. This refuge lacked a master plan to accomplish the actions above in a landscape that has changed considerably since the refuge was established. The economy and land ownership patterns in the region have changed, pressures for public access have continued to grow, and new ecosystem and species conservation plans bearing directly on refuge management have been developed.

Second, we needed to identify and prioritize certain facility improvements that include rehabilitating the historic structure that serves as our refuge headquarters and visitor contact facility, as well as evaluate the need for roads, trails, and parking improvements.

Third, we have developed strong partnerships vital for our continued success, and we must convey our vision for the refuge to those partners and the public.

Finally, we need a CCP to guide us in conserving Federal trust species in the Eastern Neck area of the Chesapeake Bay (Bay) that is also consistent with the vision, goals, and objectives of the CM Refuge Complex CCP (USFWS 2006a).

All of those reasons clearly underscore the need for the strategic direction a CCP provides. Its effectiveness will depend on involvement by the natural resource agencies of the State of Maryland, affected communities, individuals and organizations, and our conservation partners.

Eastern Neck Refuge Management Profile

Refuge Establishing Authority and Purpose

Eastern Neck Refuge was established by executive order on December 27, 1962, under the Migratory Bird Conservation Act (16 U.S.C. 715 d) with an official purpose "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." Acquisition of the entire island, except for a one-tenth acre parcel owned by Kent County at Bogles Wharf, was completed in 1967. By virtue of its strategic location at the confluence of the Chester River and the Bay, it is of particular and significant value to migrating and wintering waterfowl on Maryland's Upper Eastern Shore.

Farming and hunting prevailed on the island prior to 1962, which was known as one of Maryland's best hunting areas. At that time, much of the island was owned by hunting clubs (USFWS 2007a); however, one major tract was owned by the Cape Chester Development Corporation which had sub-divided that tract into many small residential lots. Local and regional interest in protecting the island as a refuge increased as plans to create a subdivision further developed. Service acquisition spared Eastern Neck Island the impacts of further development. Only one speculation home was built prior to Service acquisition and that home became the original refuge headquarters.

Today, the refuge provides habitat for more than 240 bird species. Bald eagles are year round residents. The refuge also hosts a large variety of migrating waterfowl that congregate in the thousands, and provides staging and wintering habitat for tundra swans, a population of global importance. Although they are a rare sight on the refuge today, in the past, the refuge has supported a population of the Federal-listed endangered Delmarva fox squirrel. The refuge also serves as a highly valued natural area for wildlife-dependent recreational uses with

an estimated 55,000 visitors annually. Refuge lands are also used to showcase and demonstrate projects related to landscaping with native plant species, best management farming and forestry practices, and use of wind and solar alternative energy sources.

Refuge Administration

Eastern Neck Refuge is administered as part of the CM Refuge Complex, with headquarters in Cambridge, Maryland on Blackwater Refuge. Administrative offices, a visitor contact facility, and a Friends of Eastern Neck gift shop are located in the historic hunting lodge on the refuge. This CCP will provide strategic direction for refuge planning and management. Development of step-down plans, as detailed in chapter 4, will serve to further refine refuge planning and implementation. Map 1.2 depicts the current refuge and its features. Refer to Chapter 4, Maps 4.1 and 4.2, for depictions of refuge features after full implementation of this CCP.

Refuge Vision

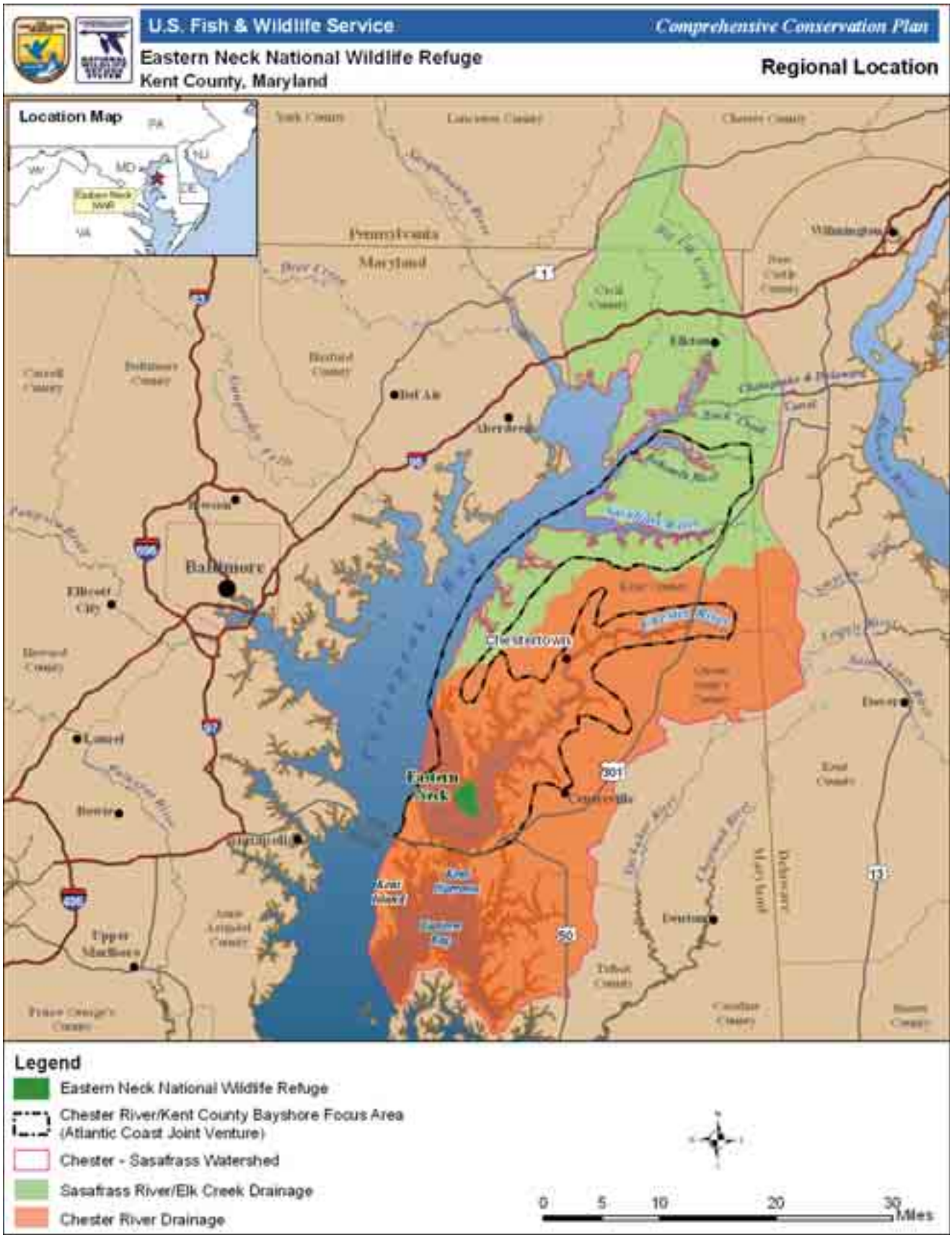
Very early in the planning process, our team developed this vision statement to provide a guiding philosophy and sense of purpose in the CCP.

> *"Eastern Neck National Wildlife Refuge will sustain diverse and healthy aquatic, tidal marsh, and uplands habitats to support robust populations of Federal trust species and remain an essential link in the network of conserved lands in the Chesapeake Bay. Our successes will be supported by the strong partnerships we develop with other Federal agencies, State agencies, conservation organizations, land managers, and neighboring communities. Working with those partners will provide the opportunity to showcase and demonstrate a science-based, adaptive management approach, with emphasis on the protection and restoration of shoreline and tidal marsh.*
>
> *We will continue to reward all who visit with an opportunity to immerse themselves in the natural sights and sounds of the Chesapeake Bay. The thrill of observing more than 100,000 migrating and wintering waterfowl moving in and out of the refuge each year, including the rare tundra swan, is an experience that forms a lasting impression about the wonders of nature. Visitors will also be delighted by the refuge's healthy populations of bald eagles and ospreys as they dive for fish and attend to their young. They will also enjoy the opportunity to observe the phenomenon of over 100 species of birds migrating through each fall. We will enhance these and other refuge experiences by providing exceptional interpretive and visitor programs about the Chesapeake Bay and its rich diversity of natural and cultural resources.*
>
> *We hope residents of neighboring communities on the Delmarva Peninsula will value the refuge for enhancing their quality of life. Within the National Wildlife Refuge System, the refuge will be treasured for conserving the Chesapeake Bay's Federal trust resources and providing inspirational outdoor experiences for present and future generations of Americans."*

Refuge Goals

We developed the following goals after considering the refuge's purposes, the missions of the Service and the Refuge System, public and partner input, and the mandates, plans, and conservation initiatives we describe below. These goals are intentionally broad, descriptive statements of purpose. They highlight elements of our vision statement for the refuge that we emphasize in management objectives and strategies. Goal 1 takes precedence; but otherwise, we do not present them in any particular order. Chapter 4 offers a rationale for each goal and its accompanying objectives.

Map 1.2. Eastern Neck Refuge Boundary and Features



GOAL 1: **Protect and enhance Service trust resources, and species and habitats of special concern in the Chesapeake Bay region by:**

- Maintaining and restoring the integrity of the refuge shoreline and nearshore environments to sustain Service trust resources and diverse natural communities;
- Managing refuge habitats, as part of a regional partnership, to sustain wintering populations of migratory waterfowl in the lower Chester River Basin and contribute to the North American Waterfowl Management Plan population goals for the Chester River and Kent County Bayshore Focus Area;
- Managing for a variety of upland refuge habitats to continue to support the rich diversity of songbirds, raptors, butterflies, and other native wildlife;
- Enhancing, through partnerships, the management, protection and monitoring of inter-jurisdictional fish and other aquatic species on the refuge and in surrounding waters; and,
- Protecting and restoring archeological and cultural resources on the refuge.

Our highest priority over the next 15 years is to protect against additional refuge shoreline erosion and loss of refuge tidal marsh. Shoreline and tidal marsh habitats are threatened by erosive forces and invasive species; nearby shallow waters and submerged aquatic vegetation (SAV) beds also face these threats and the impact of pollutants. The integrity of the refuge, and its ability to support both aquatic and terrestrial Federal trust species and habitats, depends on stemming shoreline, tidal marsh and SAV bed losses. The protection and monitoring of species that rely on these habitat areas, such as inter-jurisdictional fish, shellfish, the diamondback terrapin, horseshoe crab, and other aquatic species on the refuge, is an important part of this goal.

Other focal species for the refuge include resident bald eagles, migratory and wintering waterfowl, and a wide diversity of migratory songbirds and shorebirds. Waterfowl habitat management is part of a regional partnership to sustain wintering populations of migratory waterfowl and contribute to North American Waterfowl Management Plan population goals. The Upper Eastern Shore of the Bay has historically sustained the greatest concentrations of Atlantic Population (AP) Canada geese and other wintering waterfowl in the Atlantic Flyway. Wintering waterfowl are attracted to the Chester River Basin because of its extensive areas of brackish tidal marsh, open shallow water, and SAV beds. Eastern Neck Refuge, which is uniquely located in the lower Chester River Basin and serves as the only protected Federal land on the Upper Eastern Shore of Maryland, provides sanctuary, shelter from severe weather, and food to sustain these wintering waterfowl and other migratory birds. The rare tundra swan also winters in the shallow waters near the refuge.

Other Federal trust resources covered by this goal are the many cultural resources on refuge lands. The refuge's long history of pre-colonial and colonial uses has resulted in structures and sites eligible for the National Historic Register which require special protection under Federal laws, such as the National Historic Preservation Act.

GOAL 2: **Maintain a healthy and diverse complex of natural community types comprised of native plants and animals to pass on to future generations of Americans by:**

- Protecting, enhancing, and restoring the natural diversity, integrity and health of community types and associated native plants and animals, and sensitive species on the refuge; and,
- Protecting the integrity of federal-designated research and public use natural areas.

Eastern Neck refuge supports a wide diversity of habitats, with brackish tidal marshes, natural ponds and impoundments, upland forests, hedgerows, grasslands, and a variety of managed rotational croplands. In addition to the waterfowl and bald eagles mentioned in goal 1, these diverse habitats support a broad array of breeding and migrating songbirds as well as other native wildlife, including reptiles and invertebrates. Native snakes are relatively common on the refuge. Refuge grasslands provide a stopping over point for migrating monarch butterflies. Other species of breeding butterflies, dragonflies and damselflies are prevalent. An interesting array of beetles has been documented on the refuge as well. Chapter 3 describes wildlife documented on the refuge. Our challenge is to use our available resources as effectively as possible to deal with invasive plants and animals, optimize the mix of habitat types, and accommodate compatible wildlife-dependent public uses. Our goal is to manage these habitats to sustain a diversity of native species for the long term and to minimize invasive species.

GOAL 3: **Conduct effective outreach activities and develop and implement quality wildlife-dependent public use programs, with an emphasis on wildlife observation and photography, to raise public awareness of the refuge and the Refuge System, and promote enjoyment and stewardship of natural resources in the Chesapeake Bay region by:**

- Enhancing and increasing effective public outreach activities to increase the visibility of the Service, the refuge, and the Refuge System and to garner increased appreciation and support for our conservation activities;
- Ensuring that visitors are satisfied with the safety, accessibility, and quality of opportunities to observe and photograph wildlife on the refuge;
- Providing opportunities for quality, recreational fishing and hunting;
- Providing opportunities for environmental education and interpretation that enhance refuge visitor's understanding of the significant natural resources in the Chesapeake Bay area, as well as the important role the refuge plays in its conservation; and
- Providing opportunities for the public to engage in refuge activities through a Friends Group, an organized volunteer program, and through partnerships with individuals, other agencies, universities, and other institutions, thereby promoting the mission, management and objectives of the refuge and the Refuge System.

Our desire is to be a recognized, welcomed, and valued part of the Eastern Shore community. Our concern is that we are not well known in the Kent County area. Raising the visibility of the Service, the Refuge System, and the refuge will encourage people to learn about the importance of refuge habitats and species of concern, and the refuge's role in conserving Bay resources. An effective outreach program will enhance support for our programs and allow us to proactively anticipate and deal with public issues if they arise.

Hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation are the six priority wildlife-dependent public uses identified in the Refuge Improvement Act. The Act stipulates those six uses are to receive enhanced consideration in refuge planning, but does not establish a hierarchy among those six uses. Opportunities to engage in them should be provided to the extent compatible with specific refuge goals and objectives. The ability to fund the management of these activities is also a factor for refuge managers to consider in determining their compatibility. Service policy requires that refuge managers set limits on, and establish stipulations for, any of those activities as warranted to ensure their compatibility. Each of these activities is already facilitated on current refuge lands.

Regional Context and Project Analysis Area

The regional context (map 1.3) for the CCP is the subwatersheds of northeastern Chesapeake Bay and the area defined by the Atlantic Coast Joint Venture as the Chester River and Kent County Bayshore focus area (*http://www.acjv.org/wip/acjv_wip_midatlantic.pdf*). The regional context encompasses the farmlands and riverine wetlands that support major waterfowl populations on the Upper Eastern Shore of Maryland. None of the other lands of the Refuge Complex occur in this focus area.

The project analysis area (map 1.4) includes the tidal marshes and uplands of Eastern Neck island over which the Service has direct management control and the mesohaline (brackish) portion of the Bay that includes waters north of Kent Island along the Upper Eastern Shore of Mayland including the waters at the mouth of the Chester River defined as the Lower Chester River Basin, that are of major significance to waterfowl and other Service trust resources.

The Service and the Refuge System Policies and Mandates Guiding Planning

The U.S. Fish and Wildlife Service and its Mission

The Service is part of the Department of the Interior. The Service's mission is

> *"Working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people."*

Congress entrusts to the Service the conservation, protection and enhancement of these national natural resources: migratory birds, anadromous and interjurisdictional fish, Federal-listed endangered or threatened species, wetlands, certain marine mammals, and national wildlife refuges. The Service also operates national fish hatcheries, fisheries assistance field offices, and ecological services field offices. It also enforces federal wildlife laws and international treaties on importing and exporting wildlife, assists states with their fish and wildlife programs, and helps other countries develop conservation programs.

The Service manual, available online at *http://www.fws.gov/policy/manuals/*, contains the standing and continuing directives on fulfilling our responsibilities. The 600 series of the Service manual addresses land use management, and sections 601-609 specifically address management of national wildlife refuges.

The Service publishes special directives that affect the rights of citizens or the authorities of other agencies separately in the Code of Federal Regulations (CFR); the Service manual does not duplicate them (see 50 CFR 1–99 online at *http://www.gpoaccess.gov/cfr/index.html*).

Map 1.3. Eastern Neck Regional Context

Map 1.4. Eastern Neck Refuge Project Analysis Area

James Prince/Usfws

Wood duck

The National Wildlife Refuge System and its Mission and Policies

The Refuge System is the world's largest collection of lands and waters set aside specifically for the conservation of wildlife and the protection of ecosystems. More than 550 national wildlife refuges encompass over 150 million acres of lands and waters in all 50 states and several U.S. island territories. Each year, more than 40 million visitors hunt, fish, observe and photograph wildlife, or participate in environmental education and interpretation on refuges.

In 1997, President William Jefferson Clinton signed into law the Refuge Improvement Act. That act establishes a unifying mission for the Refuge System.

> *"The mission of the System 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."*—Refuge Improvement Act; Public Law 105-57

It also establishes a new process for determining the appropriateness and compatibility of public uses on refuges and requires us to prepare a CCP for each refuge. The Act states that the Refuge System must focus on wildlife conservation as its highest priority. It also states that the mission of the Refuge System, coupled with the purposes for which each refuge was established, will provide the principal management direction on that refuge.

The Refuge System Manual contains policy governing the operation and management of the Refuge System that the Service Manual does not cover, including technical information on implementing refuge polices and guidelines on enforcing laws. You can review that manual at refuge headquarters. We describe below a few noteworthy policies instrumental in developing this CCP. These policies can be accessed at: *http://www.fws.gov/refuges/policiesandbudget/refugepolicies.html.*

Policy on Refuge System Planning
This policy (602 FW 1, 2, and 3) establishes the requirements and guidance for Refuge System planning, including CCPs and step-down management plans. It states that we will manage all refuges in accordance with an approved CCP that, when implemented, will help

- Achieve refuge purposes;
- Fulfill the Refuge System mission;
- Maintain and, where appropriate, restore the ecological integrity of each refuge and the refuge system;
- Achieve the goals of the National Wilderness Preservation System and the National Wild and Scenic Rivers System; and,
- Conform to other Service mandates.

The planning policy provides guidance, systematic direction, minimum requirements for developing all CCPs, and provides a systematic decision-making process that fulfills those requirements. Among them, we are to review any existing special designation areas or the potential for such designations (e.g., wilderness and wild and scenic rivers); and, incorporate a summary of those reviews into each CCP (602 FW 3).

Policy on Maintaining Biological Integrity, Diversity, and Environmental Health
This policy provides guidance on maintaining or restoring the biological integrity, diversity, and environmental health of the Refuge System, including the protection of a broad spectrum of fish, wildlife, and habitat resources in refuge ecosystems. It provides refuge managers with a process for evaluating the best management direction to prevent the additional degradation of environmental conditions and restore lost or severely degraded environmental components. It also provides guidelines for dealing with external threats to the biological integrity, diversity, and environmental health of a refuge and its ecosystem (601 FW 3).

Policy on Appropriateness of Refuge Uses
Federal law and Service policy provide the direction and planning framework for protecting the Refuge System from inappropriate, incompatible or harmful human activities and ensuring that visitors can enjoy its lands and waters. This policy (603 FW 1) provides a national framework for determining appropriate refuge uses in an effort to prevent or eliminate those uses that should not occur in the Refuge System. It describes the initial decision process the refuge manager follows when first considering whether or not to allow a proposed use on a refuge. An appropriate use must meet at least one of the following four conditions:

1) The use is a wildlife-dependent recreational use as identified in the Refuge Improvement Act.

2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, and goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Refuge 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 after concluding a specified findings process using 10 criteria.

Policy on Compatibility
This policy (603 FW 2) complements the appropriateness policy. The refuge manager must first find a use is appropriate before undertaking a compatibility review of that use. If the proposed use is not appropriate, the refuge manager will not allow the use and will not prepare a compatibility determination.

This policy includes a detailed description of the process and requirements for conducting compatibility reviews. Our summary follows:

- The Refuge Improvement Act and its regulations require an affirmative finding by the refuge manager on the compatibility of a public use before we allow it on a national wildlife refuge.
- A compatible use is one "that will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge."
- The act defines six wildlife-dependent uses that are to receive our enhanced consideration on refuges: hunting, fishing, wildlife observation and photography, and environmental education and interpretation.
- The refuge manager may authorize those priority uses on a refuge when they are compatible and consistent with public safety.

Annual youth fishing derby

Jonathan Priday/USFWS

When the refuge manager publishes a compatibility determination, that determination will stipulate the required maximum reevaluation dates established in policy: 15 years for wildlife-dependent recreational uses; or, 10 years for other uses.

The refuge manager may reevaluate the compatibility of any use at any time, including prior to its mandatory reevaluation date identified on an approved determination. For example, this may occur if new information reveals unacceptable impacts or incompatibility with refuge purposes (602 FW 2.11, 2.12). The refuge manager may allow or deny any use, even one that was previously determined compatible, based on other considerations such as public safety, policy, or available funding.

Other Mandates

Although Service and Refuge System policy and the purpose(s) of each refuge provide the foundation for its management, other federal laws, executive orders, treaties, interstate compacts, and regulations on conserving and protecting natural and cultural resources also affect how we manage refuges. Our "Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service" describes many of them at *http://www.fws.gov/laws/Lawsdigest.html*.

Of particular note are Federal laws that require the Service to identify and preserve its important historic structures, archaeological sites, and artifacts. NEPA mandates our consideration of cultural resources in planning Federal actions. The Refuge Improvement Act requires the CCP for each refuge to identify its archaeological and cultural values. Following is a highlight of some cultural and historic resource protection laws which relate to the development of CCPs.

- The Archaeological Resources Protection Act (16 U.S.C. 470aa–470ll; Pub.L. 96–95) approved October 31, 1979, (93 Stat. 721), referred to as ARPA, largely supplanted the resource protection provisions of the Antiquities Act of 1906 for archaeological items. ARPA establishes detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from federal or Native American lands. It also establishes civil and criminal penalties for the unauthorized excavation, removal, or damage of those resources; for any trafficking in those removed from federal or Native American land in violation of any provision of federal law; and for interstate and foreign commerce in such resources acquired, transported or received in violation of any state or local law.

- The Archeological and Historic Preservation Act (16 U.S.C. 469–469c; Pub.L. 86–523,) approved June 27, 1960, (74 Stat. 220) as amended by Pub.L. 93–291, approved May 24, 1974, (88 Stat. 174) carries out the policy established by the Historic Sites Act (see below). It directs federal agencies to notify the Secretary of the Interior whenever they find that a federal or federal-assisted licensed or permitted project may cause the loss or destruction of significant scientific, prehistoric or archaeological data. The Act authorizes the use of appropriated, donated or transferred funds for the recovery, protection and preservation of that data.

- The Historic Sites, Buildings and Antiquities Act (16 U.S.C. 461–462, 464–467; 49 Stat. 666) of August 21, 1935, popularly known as the Historic Sites Act, as amended by Pub.L. 89–249, approved October 9, 1965, (79 Stat. 971), declares it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provides procedures for designating, acquiring, administering and protecting them. Among other things, National Historic and Natural Landmarks are designated under the authority of this act.

- The National Historic Preservation Act of 1966 (16 U.S.C. 470–470b, 470c–470n), Pub.L. 89–665, approved October 15, 1966 (80 Stat. 915) and repeatedly amended, provides for the preservation of significant historical features (buildings, objects and sites) through a grant-in-aid program to the states. It establishes a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468–468d). This act establishes an Advisory Council on Historic Preservation, which became a permanent, independent agency in Pub.L. 94–422, approved September 28, 1976 (90 Stat. 1319). The act created the Historic Preservation Fund. It directs federal agencies to take into account the effects of their actions on items or sites listed or eligible for listing on the National Register.

The Service also has a mandate to care for museum properties it owns in the public trust. The most common are archaeological, zoological, botanical collections, historical photographs, historic objects, and art. Each refuge maintains an inventory of its museum property. Our museum property coordinator in Hadley, Massachusetts, guides refuges in caring for these properties, and helps us comply with the Native American Grave Protection and Repatriation Act and Federal regulations governing Federal archaeological collections. Our program ensures that those collections will remain available to the public for learning and research.

Other Federal resource laws are also important to highlight as they are integral to developing a CCP. The Wilderness Act of 1964 (16 U.S.C. 1131–1136; Pub. L. 88–577) establishes a National Wilderness Preservation System (NWPS) that is composed of Federal-owned areas designated by Congress as "Wilderness Areas." The Act directs each agency administering designated wilderness to preserve the wilderness character of areas within the NWPS, and to administer the NWPS for the use and enjoyment of the American people in a way that will leave those areas unimpaired for future use and enjoyment as wilderness. The Act also directs the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 acres or more and every roadless island (regardless of size) within National Wildlife Refuge and National Park systems for inclusion in the National Wilderness Preservation System. Service planning policy requires that we evaluate the potential for wilderness on refuge lands, as appropriate, during the CCP planning process.

The Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 et seq.; Pub. L. 90-542 as amended), 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. Service planning policy requires that we evaluate the potential for Wild and Scenic Rivers designation on refuge lands, as appropriate, during the CCP planning process.

Our mandates also include orders by the President, Secretary of Interior and/or Director of the U.S. Fish and Wildlife Service. We highlight two of those orders below.

- Presidential Executive Order 13508—Chesapeake Bay Protection and Restoration, was issued on May 12, 2009. This order furthers the purpose of the Clean Water Act of 1972, as amended (33 U.S.C. 1251 et seq.), and other laws "…to protect and restore the health, heritage, natural resources, and social and economic value of the Nation's largest estuarine ecosystem and the natural sustainability of its watershed." It recognizes the Chesapeake Bay as "a national treasure constituting the largest estuary in the United States and one of the largest and most biologically productive estuaries in the world."

- It directs the establishment of a Federal Leadership Committee chaired by the Administrator of the Environmental Protection Agency, or their designee, with participation by all Federal agencies with jurisdiction in the Bay. The Committee's purpose is to lead the effort to restore the health of the Chesapeake Bay under a renewed commitment to control pollution from all sources as well as protect and restore habitat and living resources, conserve lands, and improve management of natural resources, all of which contribute to improved water quality and ecosystem health.

- This order also develops a strategy for coordinated implementation of existing programs and projects, and an annual action plan and accomplishment reports. It also requires collaboration with state partners. The focus of the coordinated implementation plan will be to address: 1) water quality; 2) sources of pollution from agricultural lands and federal lands and facilities; 3) protecting the Bay's resources as the climate changes; 4) expanding opportunities for public access; 5) conserving landscapes and ecosystems; and, 6) the monitoring and accountability of activities.

- Secretarial Order 3289 – Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources, was issued on September 14, 2009. This order establishes a Department-wide,

science-based approach to increasing our understanding of climate change and to coordinate an effective response to its impacts on tribes and on the land, water, ocean, fish and wildlife, and cultural heritage resources that the Department manages. The order establishes a "Climate Change Response Council" that will execute a coordinated Department-wide strategy to increase scientific understanding and the development of adaptive management tools to address the impact of climate change on our natural and cultural resources. The Council will help coordinate activities within and among federal agencies. Land management agencies are directed to pursue appropriate activities to reduce their carbon footprint, adapt water management strategies to address the possibility of a shrinking water supply, and protect and manage land in anticipation of sea level rise, shifting wildlife populations and habitats, increased wildland fire threats, and an increase in invasive and exotic species.

- Presidential Executive Order 13443 - Facilitation of Hunting Heritage and Wildlife Conservation was issued on August 16, 2007. The purpose of this order is to direct Federal agencies that have programs and activities affecting public land management, outdoor recreation, and wildlife management, including the Department of the Interior and the Department of Agriculture, to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat. Federal agencies are directed to pursue certain activities listed in the Order, consistent with their missions. Those activities include managing wildlife and wildlife habitats on public lands in a manner that expands and enhances hunting opportunities, and working with state and tribal governments to manage wildlife and habitats to foster healthy and productive populations and provide appropriate opportunities for the public to hunt those species.

Conservation Plans and Initiatives Guiding the Project

Birds of Conservation Concern 2008 Report (USFWS 2008)

The Service developed this report (USFWS 2008) as an update to their 2002 report in consultation with the leaders of ongoing bird conservation initiatives and such partnerships as Partners in Flight (PIF), the North American Waterfowl Management Plan (NAWMP) and Joint Ventures, the North American Waterbird Conservation Plan (NAWCP), and the U.S. Shorebird Conservation Plan. It fulfills the mandate of the 1988 amendment to the Fish and Wildlife Conservation Act of 1980 (100 Pub. L. 100–653, Title VIII), requiring the Secretary of the Interior, through the Service, to "identify species, subspecies, and populations of all migratory non-game birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973."

The overall goal of this report is to accurately identify the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent our highest conservation priorities.

The geographic scope of this endeavor is the entire U.S., including U.S. island territories in the Pacific and Caribbean. The report encompasses three distinct geographic scales: 1) National; 2) North American Bird Conservation Initiative (NABCI) Bird Conservation Regions (BCRs); and, 3) the eight Service Regions.

This report lists priority bird species of conservation concern at each scale which are primarily derived from assessment scores from three major bird conservation plans: 1) the Partners in Flight North American Landbird Conservation Plans; 2) the U.S. Shorebird Conservation Plan; and 3) the North American Waterbird

Conservation Plan. Bird species included on lists in the report include nongame birds, gamebirds without hunting seasons, subsistence-hunted nongame birds in Alaska, and Federal Endangered Species Act candidate, proposed endangered or threatened, and recently delisted species. Population trends, threats distribution, abundance and relative density were all factors considered.

This report is intended to stimulate coordinated and collaborative proactive conservation actions among Federal, State, Tribal, and private partners. It is hoped that by focusing attention on these highest-priority species, this report will promote greater study and protection of the habitats and ecological communities upon which these species depend, thereby contributing to healthy avian populations and communities. You may access the report at:*http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf* This is one of the plans we used in identifying species of concern in appendix A, and in developing management objectives and strategies under goals 1 and 2.

North American Waterfowl Management Plan (NAWMP; update 2004) and Joint Venture Plans

Originally written in 1986, the NAWMP describes a 15-year strategy for the United States, Canada, and Mexico to restore and sustain waterfowl populations by protecting, restoring and enhancing habitat. The plan committee, including representatives from all three countries has modified the 1986 plan twice to account for biological, sociological, and economic changes that influenced the status of waterfowl and to allow cooperative habitat conservation. The most recent modification in 2004 updates the latest needs, priorities, and strategies for the next 15 years, and guides partners in strengthening the biological foundation of North American waterfowl conservation and stakeholder confidence in the direction of the plan. You may access the report at: *http://www.fws.gov/birdhabitat/NAWMP/files/ImplementationFramework.pdf.*

To convey goals, priorities, and strategies more effectively, that 2004 modification comprises two separate documents: Strategic Guidance and Implementation Framework. The former is for agency administrators and policy-makers who set the direction and priorities for conservation. The latter includes supporting technical information for use by biologists and land managers.

The plans are implemented at the regional level in 14 habitat Joint Ventures and 3 species Joint Ventures (Arctic Goose, Black Duck, and Sea Duck). Eastern Neck refuge lies in the Atlantic Coast Joint Venture (ACJV), which includes all the Atlantic Flyway states from Maine to Florida and Puerto Rico. The ACJV Waterfowl Implementation Plan was completed in June 2005. The refuge lies within the plan's "Chester River and Kent County Bayshore" focus area. Map 1.1 shows the focus area, or you may view it online at *http://www.acjv.org/.*

The waterfowl goal for the ACJV is to… "Protect and manage priority wetland habitats for migration, wintering, and production of waterfowl, with special consideration to black ducks, and to benefit other wildlife in the joint venture area." The Black Duck Joint Venture plan also relates to our CCP. American black ducks use the refuge during the winter and migration, but are less common during their breeding season as their primary breeding grounds are in Canada. The Black Duck Joint Venture Final Draft Strategic Plan (USFWS/CWS 1993) resides online at *http://www.pwrc.usgs.gov/bdjv/.* We referred to both Joint Venture plans in developing the management objectives and strategies under goals 1 and 2.

Mid-Atlantic/Southern New England Bird Conservation Region (BCR-30) Implementation Plan (2007)

The New England/Mid-Atlantic Coast Bird Conservation Region (BCR 30) provides important resources for migratory birds whose ranges span the western hemisphere. Habitats associated with coastal ecosystems provide the highest habitat values and provide critical staging areas for migratory waterfowl, waterbirds, shorebirds, and landbirds. Coastal beaches and wetlands, followed by forested upland communities, are considered the most important

habitats in need of protection for migratory birds in the BCR. The Chesapeake and Delaware bays, as well as other major bays in the BCR, provide resources critical to many migrating birds as they journey from their breeding sites in the north to non-breeding sites in Mexico, Central America, the Caribbean and South America.

Unfortunately, the majority of the lands within BCR 30 have been altered from their historic condition. From Boston to Washington D.C., BCR 30 supports the highest density of humans on the U.S. East Coast. Much of the landscape in the BCR is dominated by urban development. Habitat loss and degradation (e.g. fragmentation, agriculture, and invasive species) are the greatest threats to bird populations in BCR 30. This plan identifies the bird species and habitats in greatest need of conservation action in this region, activities thought to be most useful to address those needs, and geographic areas believed to be the most important places for conservation work to occur. The plan (USFWS 2007b) establishes a regional bird conservation initiative with partners across BCR 30, communicating their conservation planning and implementation activities to deliver high priority conservation actions in a coordinated manner. *It can be accessed on-line at http://www.acjv.org.*

One major objective of this and other BCR plans is to "step-down" or integrate the goals of continental bird conservation plans. Within BCR 30, the respective Partners in Flight plans (see below), the U.S. Shorebird Conservation Plan (see below), the North American Waterbird Conservation Plan (see below) and the North American Waterfowl Management Plan are included. The BCR 30 Plan brings the common goals of these plans together into one document that can be used by state agencies, non-governmental organizations (NGOs), and other bird conservation interests to implement bird conservation activities in this region. The plan also merges material from other plans and technical workshops, including, but not limited to, the BCR 30- Partners In Flight (PIF) Mini Plan, BCR 30 Coordinated Monitoring Workshop, the Mid-Atlantic New England Maritimes Regional Waterbird Plan, the December 2004 BCR 30 All-Bird Conservation Workshop, and other materials. We referred to this plan as we developed management objectives and strategies under goals 1 and 2, and to create appendix A, "Species and Habitats of Conservation Concern."

North American Waterbird Conservation Plan (Version 1, 2002)

This plan (Kushlan et al. 2002) is an independent partnership among individuals and institutions interested in, or responsible for, conserving water birds and their habitats. The plan is just one element of a multi-faceted conservation program. The primary goal of the plan is to ensure that the distribution, diversity, and abundance of populations and habitats of breeding, migratory, and non-breeding water birds are sustained or restored throughout the lands and waters of North America, Central America, and the Caribbean. It provides a framework for conserving and managing colonially nesting water-dependent birds. In addition, it facilitates continent-wide planning and monitoring, national, state, and provincial conservation, regional coordination, and local habitat protection and management. You can access the continental plan online at *http://www.pwrc.usgs.gov/nacwcp/nawcp.html.* We referred to this plan as we developed management objectives and strategies under goals 1 and 2, and to create appendix A, "Species and Habitats of Conservation Concern."

Mid-Atlantic/New England/Maritimes (MANEM) Waterbird Conservation Plan (2008)

A partnership of organizations and individuals working to facilitate waterbird conservation in the Mid-Atlantic/New England/Maritimes (MANEM) region of the U.S and Canada has developed this regional waterbird conservation plan. Over 200 partners comprising the MANEM Waterbird Working Group compiled and interpreted technical information on the region's waterbird populations and habitats, assessed conservation status of these natural resources, developed

strategies to ensure the persistence of sustainable waterbird populations in the region, and identified near term priorities. MANEM partners include wildlife managers, scientists, policy makers, educators, and other supporters.

The MANEM region consists of Bird Conservation Regions 14 (Atlantic Northern Forest) and 30 (New England/Mid-Atlantic Coast), and Pelagic Bird Conservation Regions 78 (Northeast US Continental Shelf) and 79 (Scotian Shelf). The MANEM Waterbird Conservation Plan is being implemented within the context and framework of the North American Waterbird Conservation Plan—a project of the Waterbird Conservation for the Americas Initiative *(www.waterbirdconservation.org).*

Seventy-four waterbird species use habitats in MANEM for breeding, migrating, and wintering. Avian families include loons, grebes, shearwaters, storm-petrels, boobies, pelicans, cormorants, herons, ibises, rails, gulls, terns, skuas, jaegers and alcids. Partners in 4 subregions of MANEM selected 43 focal species for immediate conservation action. In addition, 55 of MANEM's waterbirds are identified in state wildlife action plans as "Species of Greatest Conservation Need". You can access information on Mid-Atlantic/New England/Maritimes Regional planning online at *http://www.fws.gov/birds/waterbirds/MANEM/. We referred to this plan as we developed management objectives and strategies under goal*s 1 and 2.

U.S. Shorebird (2001, 2nd ed.) and North Atlantic Regional Shorebird (2000) Plans

Concerns about shorebirds led to the creation of the U.S. Shorebird Conservation Plan in 2000. Brown, et al. published a second edition in May 2001. Developed under a partnership of individuals and organizations throughout the United States, the plan develops conservation goals for each U.S. region, identifies important habitat conservation and research needs, and proposes education and outreach programs to increase public awareness of shorebirds and of threats to them. You may read the U.S. Shorebird Plan online at *http://www.fws.gov/shorebirdplan/USShorebird/downloads/USShorebirdPlan2Ed.pdf.*

In the Northeast, the North Atlantic Regional Shorebird Plan was also drafted to step down the goals of the continental plan to smaller scales to identify priority species, species goals, habitats, and prioritize implementation projects. The North Atlantic Regional Shorebird Plan appears online at *http://www.fws.gov/shorebirdplan/RegionalShorebird/RegionalPlans.htm*. We used both plans in developing our objectives and strategies for goals 1 and 2.

National Bald Eagle Management Guidelines (2007)

In July 2007, the Service issued a final ruling to officially remove the bald eagle from the Federal list of endangered and threatened species due to successful recovery throughout its range in the lower 48 states. The bald eagle continues to be protected by the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). The Service developed these National Bald Eagle Management Guidelines to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of the Eagle Act may apply to their activities. The guidelines are intended to help people minimize such impacts to bald eagles, particularly where they may constitute disturbance, which is prohibited by the Eagle Act. The guidelines are intended to: (1) publicize the provisions of the Eagle Act that protect bald eagles to reduce the possibility that people will violate the law, (2) advise landowners, land managers and the general public of the potential for various human activities to disturb bald eagles, and (3) encourage additional nonbinding land management practices that benefit bald eagles. The document is intended primarily as a tool for landowners and planners who seek information and recommendations regarding how to avoid disturbing

bald eagles. You can view these management guidelines at: *http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf.* We referred to these guidelines as we developed management objectives and strategies for bald eagles under goal 1.

Chesapeake Bay Bald Eagle Recovery Plan (1982)

The successful recovery of the bald eagle was, in part, due to the implementation of regional bald eagle recovery plans. During development of this CCP, we referred to the Chesapeake Bay Recovery Plan for any management recommendations that are still relevant to ensuring the survival and productivity of bald eagles in the Chesapeake Bay area.

Partners-in-Flight Bird Conservation Plans

In 1990, Partners-in-Flight (PIF) began as a voluntary, international coalition of government agencies, conservation organizations, academic institutions, private industries, and citizens dedicated to reversing the population declines of bird species and "keeping common birds common." The foundation of its long-term strategy is a series of scientifically based bird conservation plans using physiographic areas as planning units.

The goal of each PIF plan is to ensure the long-term maintenance of healthy populations of native birds, primarily non-game birds. The plan for each physiographic area ranks bird species according to their conservation priority, describes their desired habitat conditions, develops biological objectives, and recommends conservation measures. The priority ranking factors in habitat loss, population trends, and the vulnerability of a species and its habitats to regional and local threats.

Physiographic Area 44—Mid-Atlantic Coastal Plain (April 1999).
Our project area lies in Physiographic Area 44, the Mid-Atlantic Coastal Plain. We referred to this plan as we developed our management objectives and strategies under goals 1 and 2. The plan can be accessed at *http://www.blm.gov/wildlife/pl_44sum.htm.*

The plan includes objectives for the following habitat types and associated species of conservation concern on the refuge:

- Barrier and Bay Islands: piping plover, American black duck, Wilson's plover, brown pelican, American oystercatcher, black skimmer, least tern, and gull-billed tern.
- Salt Marsh: salt marsh sharp-tailed sparrow, black rail, prairie warbler, Henslow's sparrow, seaside sparrow, sedge wren, American black duck, and clapper rail.
- Forested Wetland: cerulean warbler, Swainson's warbler, Kentucky warbler, Acadian flycatcher, yellow-throated vireo, prothonotary warbler, and Louisiana waterthrush.
- Mixed Upland Forest: cerulean warbler, wood thrush, Kentucky warbler, Acadian flycatcher, worm-eating warbler, eastern wood-pewee, and Louisiana waterthrush.
- Early Successional: prairie warbler, Bachman's sparrow, Henslow's sparrow, blue-winged warbler, upland sandpiper, and white-eyed vireo.
- Fresh/Brackish Emergent Wetland: American black duck,and king rail.

We used this plan to help develop objectives and strategies for goals 1 and 2, and to create appendix A, "Species and Habitats of Conservation Concern."

A Management Plan for the Eastern Population of Tundra Swans (July 2007)

Responsibility for preparing migratory bird flyway management plans lies with Flyway Councils, which are administrative bodies who represent state and provincial wildlife agencies in North America. The Flyway Councils work cooperatively with the Service, the Canadian Wildlife Service, and the Mexican government's wildlife agency (SEMARNAT). The Eastern Population (EP) of tundra swans has been managed under a joint, four flyway management plan first developed and implemented in 1982, with additions and updates occurring in 1988 and 1998. Since 1998, a number of research projects have highlighted some of the uncertainties identified in the 1998 plan. This 2007 plan, prepared by the Ad Hoc Eastern Population Tundra Swan Committee of the four Flyway Councils, incorporates new information, particularly related to the use and accuracy of mid-winter counts, and updates its recommendations for the long-term conservation of these swans. It can be accessed on-line at *http://www.mdwfa.org/flyway.html*.

Tundra swan

Dave Herr/USFWS

The specific purpose of this plan is to identify population goals, establish guidelines and priorities for management actions, identify strategies and assign responsibilities, specify levels of public use and emphasize research needs to improve the management of EP swans. The primary management goal is to maintain an EP tundra swan population of 80,000 in the Atlantic and Mississippi Flyways. The plan discusses how the protection of breeding, staging, and wintering habitat is critical to this goal and to the long-term maintenance of EP tundra swans and the habitats they rely upon.

Eastern Neck refuge and the surrounding shallow water habitats contribute to this goal by providing important staging and wintering habitat for tundra swans. We consulted this plan and its recommended management actions as we developed an objective and strategies for tundra swan under goal 1.

A Management Plan for the Atlantic Population of Canada Geese (March 2008)

The Atlantic Flyway Council's Canada Goose Committee provides this update to the Atlantic Flyway Canada Goose Management Plan developed in 1989. The 1989 plan established population objectives and emphasized status assessments using wintering ground survey information. In 1996, in response to dramatic declines in the Atlantic Population (AP) Canada goose population and coupled with an increase in the resident Canada goose population, the Atlantic Flyway Council developed an action plan to address immediate survey and research needs that would help guide management to rebuild AP goose numbers. Management efforts since 1996 have been directed towards ensuring population growth, resulting in a significant turnaround. This 2008 plan provides management guidelines to promote continued growth of the AP goose population at sustained higher levels. It can be accessed on-line at *http://www.mdwfa.org/flyway.html*.

The overall management goal in this plan is to maintain the AP Canada goose population and their habitats at a level that provides optimum opportunities for people to hunt, view, and otherwise enjoy geese on a sustainable basis. The population objective believed necessary to achieve this goal is to maintain an index of 250,000 breeding pairs of AP Canada geese in the Ungava region of Québec, Canada.

One of the long-term strategies for maintaining this population is the conservation of important breeding, staging, and wintering habitats. Eastern Neck Refuge provides staging and wintering habitat for thousands of geese each year. We referred to this plan as we developed management objectives and strategies under goal 1.

Atlantic Flyway Mute Swan Management Plan (July 2003)

The Atlantic Flyway Council's Snow Goose, Brant and Swan Committee prepared this plan in response to the exponential growth of the invasive, exotic mute swan population in the flyway that was occurring between 1986 and 2002, especially in Maryland and Virginia where the populations were doubling every 12 years. Mute swans are a Eurasian species, not native to North America. They are highly invasive of wetland habitats, impact native species of fish and wildlife, damage commercial agricultural crops, and pose a threat to human health and safety. Because of their consumption of large quantities of submerged aquatic vegetation (SAV) and aggressive behavior, they compete directly with many other native waterbirds and fisheries for limited resources in critical habitats.

The goal of this management plan is to "reduce the mute swan populations in the Atlantic flyway to levels that will minimize negative ecological impacts to wetland habitats and native migratory waterfowl and to prevent further range expansion into unoccupied areas." This plan lists five specific management objectives and numerous associated strategies to achieve this goal. It can be accessed on-line at *http://www.mdwfa.org/flyway.html*.

We referred to this plan, as well as the Chesapeake Bay Program's mute swan plan (see below) and the Maryland Department of Natural Resources (MD DNR) mute swan plan (also below), as we developed management objectives and strategies for dealing with this invasive species under goals 1 and 2. We discuss in chapter 4, under "General Refuge Management", our intent to continue working closely with MD DNR in controlling this species.

Mute Swan in the Chesapeake Bay: A Bay-wide Management Plan (June 2004)

This plan (USFWS 2004a) was prepared by the Chesapeake Bay Program's Mute Swan Working Group. We describe the successful partnership that is the foundation of the Chesapeake Bay Program below. Mute swans were identified as one of the highest concerns among the partners in the program when asked which species are causing, or have the highest potential to cause, adverse ecological effects in the Bay's ecosystem. In response to this elevated concern, a working group of researchers, and federal and state natural resource managers was formed to develop a Bay-wide regional mute swan management plan.

The goal of the plan is to manage the Chesapeake Bay population of mute swans to a level that a) minimizes the impacts on native wildlife, important habitats, and local economies; b) minimizes conflict with humans; c) is in agreement with the Chesapeake Bay Program's Chesapeake 2000 Agreement goals for SAV and invasive species; and, d) is in agreement with the Atlantic Flyway Mute Swan Management Plan. The plan identifies management objectives and strategies that will work to meet this goal. It can be accessed on-line at *http://www.mdwfa.org/flyway.html*.

We consulted this plan, as well as the other mute swan plans identified below, as we considered management actions to control mute swan. We describe those in chapter 4, under "General Refuge Management." Our intent is to continue working closely with MD DNR to control this species.

Atlantic Flyway Resident Canada Goose Management Plan (July 1999)

This plan was cooperatively written by the State, Provincial, and Federal agencies responsible for managing local-nesting or "resident" Canada geese in the Atlantic Flyway. It does not prescribe specific regulations or dictate management policies or programs, but identifies an overall management goal and five management objectives developed by all the cooperators. The concern with resident Canada geese is that their numbers began to escalate in the 1980s and biologists became concerned that their numbers might be masking a decline in the number of migratory AP Canada geese. This concern was coupled with the recognition that the resident geese were contributing significantly to sport harvests, and human/goose conflicts in urban and suburban areas. Banding studies have confirmed that these resident geese are a distinct population from the migratory AP Canada geese with very different management needs and opportunities.

We consulted this plan as we considered alternative management actions to benefit waterfowl under goal 1 objectives. Our intent is to continue working closely with MD DNR in managing this species. The plan can be accessed at *http://www.mdwfa.org/flyway.html*.

Partners in Amphibian and Reptile Conservation, National—State Agency Herpetological Conservation Report (Draft 2004)

Partners in Amphibian and Reptile Conservation (PARC) was created in response to the increasing, well-documented national declines in amphibian and reptile populations. PARC members come from state and federal agencies, conservation organizations, museums, the pet trade industry, nature centers, zoos, utility industries, universities, herpetological organizations, research laboratories, forest industries and environmental consultants. Its five geographic regions—Northeast, Southeast, Midwest, Southwest and Northwest—focus on national and regional herpetofaunal conservation challenges. Regional working groups allow for region-specific communication.

The National State Agency Herpetological Conservation Report (NHCR), a summary report sponsored by PARC, provides a general overview of each state wildlife agency's support for reptile and amphibian conservation and research through September 2004. Each state report was compiled in cooperation with its agency's lead biologist on herpetofaunal conservation. The purpose is to facilitate communication among state agencies and partner organizations throughout the PARC network to identify and address regional and national herpetological priorities.

PARC intends to expand the scope of the NHCR to include other states, provinces, and territories. It will also include other state agencies that are supporting herpetofaunal conservation and research, such as transportation departments, park departments, and forest agencies. The U.S. Geological Survey (USGS) is supporting the Northeastern Partners in Amphibian and Reptile Conservation Home Page as part of its contribution to PARC. It is being served by the Patuxent Wildlife Research Center, part of the USGS Eastern Region (http://www.pwrc.usgs.gov/partners/). The next NHCR will also integrate the list of species of conservation concern into each state's comprehensive wildlife conservation strategy (see below). We referred to the latest draft NHCR plan in developing management objectives and strategies for goals 1 and 2, and in developing appendix A, "Species and Habitats of Conservation Concern."

U.S. Fish & Wildlife Service Fisheries Program, Northeast Region Strategic Plan 2009–2013 (January 2009)

The Service's Fisheries Program's primary mission is to work with others to maintain self-sustaining, healthy populations of coastal and anadromous fish, fish species that cross state or national boundaries, and endangered aquatic animals and their habitats. In the Northeast Region, 25 fishery management offices and national fish hatcheries work with states and other partners to

restore and protect a variety of fish and other aquatic species. Examples include Atlantic salmon *(Salmo salar)*, striped bass *(Morone saxatilis)*, American shad *(Alosa sapidissima)*, river herring *(Alosa pseudoharengus, Alosa aestivalis),* Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), horseshoe crab *(Limulus polyphemus),* American eel *(Anguilis rostrata),* and menhaden *(Brevoortia tyrannus).*

The Fisheries Program has played a vital role in conserving and managing fish and other aquatic resources since 1871. Today, the Fisheries Program is a critical partner with states, Tribes, other governments, other Service programs, private organizations, public institutions, and interested citizens in a larger effort to conserve these important resources. In 2002, working with its many partners in aquatic conservation through the Sport Fishing and Boating Partnership Council's Fisheries Steering Committee, the Service completed its Strategic Vision (Vision) document: "Conserving America's Fisheries, U.S. Fish and Wildlife Service Fisheries Program Vision for the Future." That vision document includes goals, objectives, and action items on a national programmatic scale.

- The Fisheries Program is committed to working with partners to
- Protect the health of aquatic habitats;
- Restore fish and other aquatic resources; and
- Provide opportunities to enjoy the many benefits of healthy aquatic resources.

The Regional Fisheries Program Strategic Plan is an extension of the vision, describing more specifically the tactics to be implemented by the Northeast Region to fulfill the goals and objectives identified in the vision. The first plan covered years 2004 to 2008. The current plan can be viewed at *http://www.fws.gov/northeast/fisheries/.*

This plan brings together changing national direction, institutional knowledge, analysis of spatial information, and the perspectives of our state and tribal partners to develop a strategic plan that allows this regional program to prioritize its efforts during challenging times, while promoting positive change into the future. As the plan is implemented it will we build on a strong foundation of active partnerships and past accomplishments, while recognizing that continued communication, cooperation and expansion of partnerships is essential for successful implementation of this plan and fulfillment of the Program's resource responsibilities and obligations. This plan was built off the lessons learned from implementing the 2004-2008 strategic plan.

One step-down effort resulting from the plan is the identification and ranking of fish and other aquatic species as to their level of conservation concern by hydrologic unit. We used this ranking and have consulted with the Regional Fisheries Program staff in developing aquatic objectives and strategies under goals 1 and 2, and in creating appendix A, "Species and Habitats of Conservation Concern."

Maryland Department of Natural Resources, Wildlife Diversity Conservation Plan (MD DNR 2005)

In 2002, Congress created the State Wildlife Grant (SWG) Program, and appropriated $80 million in state grants. The purpose of the program is to help State and Tribal fish and wildlife agencies conserve fish and wildlife species of greatest conservation need. The funds appropriated under the program are allocated to states according to a formula that takes into account their size and population.

To be eligible for additional federal grants and satisfy the requirements for participating in the SWG program, each state and U.S. territory was to develop a statewide "Comprehensive Wildlife Conservation Strategy" and submit it to the National Advisory Acceptance Team by October 1, 2005. Each plan was to address eight required elements, identify and focus on "species of greatest conservation need," yet address the "full array of wildlife" and wildlife-related issues, and "keep common species common."

The MD DNR called their plan a "Wildlife Diversity Conservation Plan" (WDCP). The goal of the plan is to create a vision for conserving that state's wildlife and stimulate other states, federal agencies, and conservation partners to think strategically about their individual and coordinated roles in prioritizing conservation.

In addressing the eight elements below, the WDCP supplements and validates the information we obtained from other plans, and helped us identify conservation threats and management strategies for species and habitats of conservation concern on the refuge. The expertise that convened to compile this plan, and the partner and public involvement, further enhances its benefits for us. We used it in developing objectives and strategies for goals 1 and 2, and in developing appendix A, "Species and Habitats of Conservation Concern."

The eight elements that the plan is designed to address are:

1) Information on the distribution and abundance of species of wildlife, including low and declining populations, as the state fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the state's wildlife;

2) Descriptions of locations and relative condition of key habitats and community types essential to the conservation of species identified in element 1;

3) Descriptions of problems that may adversely affect species identified in element 1 or their habitats, and priority research and survey efforts needed to identify factors that may assist in restoration and improved conservation of these species and habitats;

4) Descriptions of conservation actions necessary to conserve the identified species and habitats and priorities for implementing such actions;

5) Plans proposed for monitoring species identified in element 1 and their habitats, for monitoring the effectiveness of the conservation actions proposed in element 4, and for adapting those conservation actions to respond appropriately to new information or changing conditions;

6) Description of procedures to review the plan at intervals not to exceed 10 years;

7) Plans for coordinating, to the extent feasible, the development, implementation, review, and revision of the plan strategy with federal, state, and local agencies and Native American tribes that manage significant areas of land and water within the state, or administer programs that significantly affect the conservation of identified species and habitats; and,

8) Plans for involving the public in the development and implementation of plan strategies.

This plan can be accessed online at *http://www.dnr.state.md.us/wildlife/divplan_wdcp.asp*.

Other Regional Information Sources

We also consulted the plans and resources below as we refined our management objectives and strategies, especially those with a local context.

Chesapeake Bay Program. The Chesapeake Bay Program is a unique regional partnership directing and conducting the restoration of the Bay since the signing of the historic 1983 Chesapeake Bay Agreement. The Chesapeake Bay Program partners include the states of Maryland, Pennsylvania and Virginia; the District of Columbia; the Chesapeake Bay Commission, a tri-state legislative body; the U.S. Environmental Protection Agency, representing the federal government; and participating advisory groups. Since its inception in 1983, the Bay Program's highest priority has been the restoration of the Bay's living resources, including finfish, shellfish, Bay grasses including SAV, and other aquatic life and wildlife. Improvements include fisheries and habitat restoration, recovery of Bay grasses, nutrient and toxic reductions, and significant advances in estuarine science. The Program is responsible for many valuable reports and publications on Bay resources and is an important source of information for us. Many of these publications can be found on-line at *http://www.chesapeakebay.net/bayresourcelibrary.aspx?menuitem=13998*.

In 2000, the partnership decided to reaffirm its commitment and update its vision and goals. The result is the "Chesapeake 2000 Agreement." Five goals were established under the themes "Living Resources Protection and Restoration;" "Vital Habitat Protection and Restoration;" Water Quality Protection and Restoration;" "Sound Land Use;" and, "Stewardship and Community Engagement." We reviewed this plan's goals and recommended management actions as they relate to all our CCP goals, objectives and strategies.

In April 2007, the Program released its *Chesapeake Bay 2006 Health and Restoration Assessment*. The report gives watershed residents a clear and concise synopsis of Bay health and on-the-ground restoration efforts taking place across its vast watershed (*http://www.chesapeakebay.net/content/publications/cbp_26038.pdf*). The report is divided into two parts: Ecosystem Health and Restoration Efforts. This format of reporting, first used to detail the condition of the Bay in 2005, allows the Bay Program partnership to look at the effectiveness of clean-up actions across the entire watershed and allocate restoration efforts appropriately.

Maryland Department of Natural Resources (MD DNR). We have consulted with MD DNR staff and many of their publications in developing our plan. In addition to their state WDCP, their publication "Mute Swans in Maryland: A Statewide Management Plan" (April 14, 2003) was instrumental in developing our strategies to address invasive mute swans. We are a committed partner with MD DNR in controlling mute swans and fully subscribe to the recommendations they made in this plan. This plan can be accessed on line at *http://www.dnr.state.md.us/wildlife/finalmsplan.pdf*

Chester River Association (CRA). This group is an advocate for the health of the Chester River and the living resources it supports. CRA strives to promote stewardship of the Chester River, including its forests, marshes, fields, creeks, and streams. The group also strives to develop an understanding and appreciation of the river's place in the economic and cultural landscape of the area. CRA was founded in 1986 and established its Chester Riverkeeper program in 2002. Through meetings, forums, field trips, publications, habitat restoration projects, the Chester Testers and collaboration with community

groups and government agencies, CRA strives to improve water quality and increase public awareness of river and watershed issues. Our interests in water quality improvement in the Lower Chester River Basin include working with non-governmental organizations like the CRA.

Kent County Comprehensive Plan, May 2006. This comprehensive plan is the statement of development policy for Kent County by the County Commissioners. The Plan presents a series of goals and strategies to guide the preparation of County regulations and the application of County programs. These goals and policies are organized in eight functional categories dealing with the economy, towns and villages, the countryside, the environment, housing, transportation, community facilities and public services, and historic and cultural preservation. Each section contains a summary of important issues and trends. We referred to the land use data in this plan as we evaluated the socioeconomic impacts of implementing the CCP. These impacts were described and evaluated in the draft CCP/EA.

Jonathan Priday/USFWS

Bayscape Garden on the Refuge

Chapter 2

USFWS

Pintail duck

The Comprehensive Conservation Planning Process

The Comprehensive Conservation Planning Process

Service policy establishes an eight-step planning process that also facilitates our compliance with NEPA (Figure 2.1).[1] Our planning policy and CCP training course materials describe those steps in detail. We followed that process in developing this final CCP.

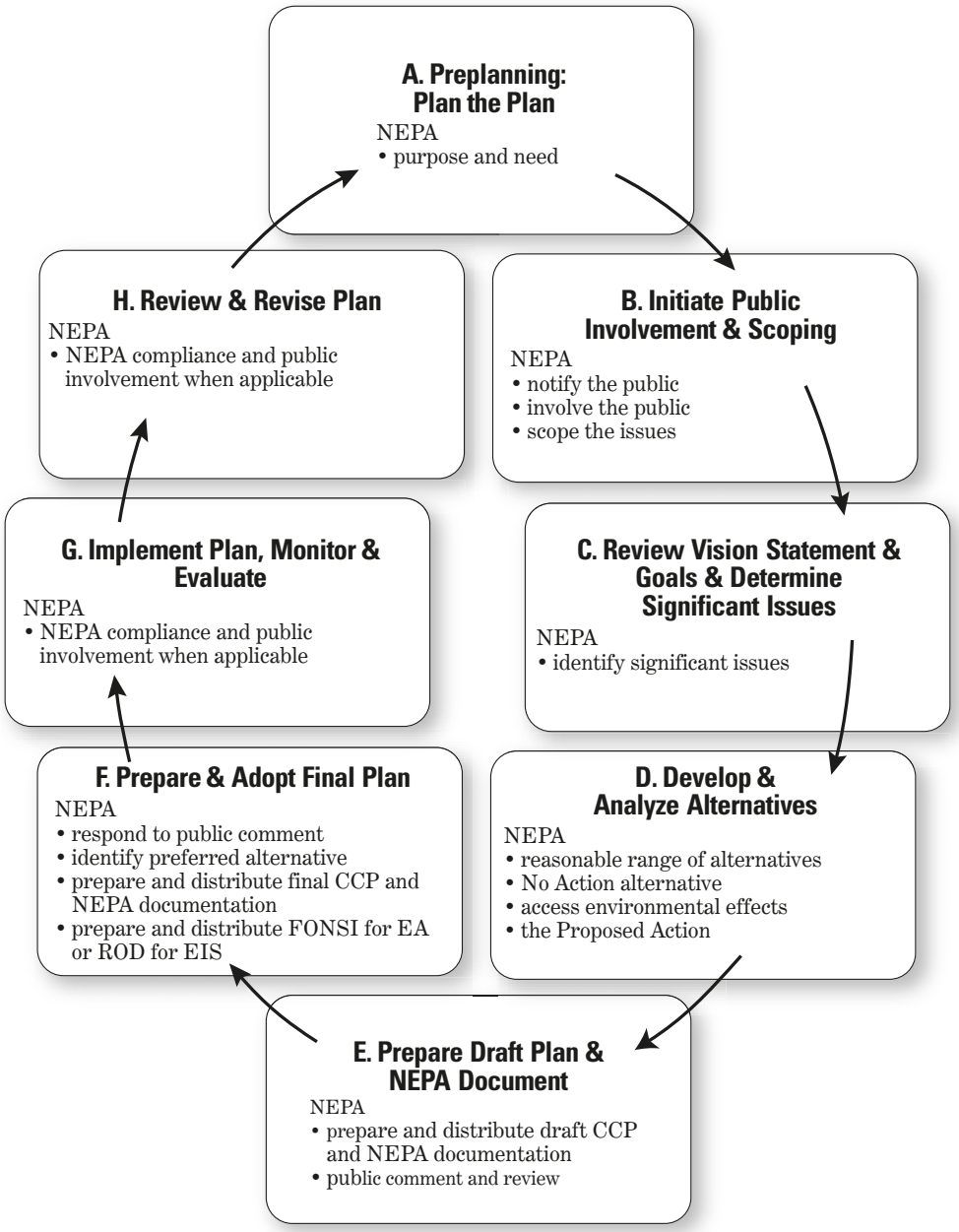


Figure 1.1. The Comprehensive Conservation Planning Process

In 2001, we initiated the planning process by collecting information on refuge resources and mapping its habitats. We undertook the following actions to complete planning steps A-D.

[1] 602 FW 3, "The Comprehensive Conservation Planning Process" *(http://policy.fws.gov/602fw3.html)*

- Held first CCP core team meeting in September 2001; drafted a vision statement and identified preliminary issues.
- Hosted an intra-agency Visitor Services Station Evaluation in September 2001.
- Hosted an intra-agency Biological Program Station Evaluation in October 2001.
- Published a Federal Register Notice of Intent (NOI) in June 2002.
- Distributed a planning newsletter in spring 2002 to announce project kick-off, and share draft vision statement.
- Held public scoping meetings in June 2002.
- Distributed a planning newsletter in spring 2003 summarizing public scoping comments and announcing project would be put on hold to complete other regional CCP projects overdue.
- Held a conservation priorities workshop with regional experts in November 2006.
- Distributed a planning newsletter in December 2006 to announce CCP process reinitiated, and share draft goals.
- Published a Federal Register NOI in January 2007 to announce CCP process reinitiated.
- Hosted a public meeting in January 2007.
- Held a series of CCP team meetings to develop alternatives from February– June 2007.
- Consulted with Service and state experts in analyzing the alternatives during June 2007 to June 2008.

As part of the planning process, we also evaluated Service fee-owned lands on the refuge for their possible inclusion into the National Wilderness Preservation System. We completed that evaluation in 2007 with the recommendation that we not proceed further with a wilderness study because we determined that refuge lands do not meet the criteria for eligibility. Please refer to the draft CCP (Appendix D) for the results of our assessment.

We completed "Step E: Prepare Draft Plan and NEPA document," in September 2009 by publishing our Notice of Availability (NOA) in the Federal Register announcing the release of the draft CCP/EA and by distributing it for a 52-day public review and comment period. We also distributed a planning newsletter announcing the NOA and availability of the draft CCP/EA, as well as information on the public comment period and how to submit responses. During the 52-day period of public review, from September 9 to October 30, 2009, we held a public meeting in Rock Hall, Maryland to obtain comments. We also received comments by regular mail, electronic mail and telephone. We then reviewed and summarized all of the comments we have received and developed our responses. These are presented in appendix H.

We submitted this final CCP to our Regional Director for his review and approval. He determined that a Finding of No Significant Impact (FONSI) was appropriate, and certified this final CCP meets agency compliance requirements, achieves refuge purposes, and helps fulfill the mission of the Refuge System. With an affirmative FONSI and other positive findings, the Regional Director approved the final CCP. We published another Federal Register NOA to announce the availability of the final plan, completing "Step F: Prepare and Adopt a Final Plan."

We can now begin "Step G: Implement Plan, Monitor and Evaluate" with the approval of this CCP. We will modify the final CCP as warranted following the procedures in Service policy (602 FW 1, 3, and 4) and NEPA requirements as part of "Step H: Review and Revise Plan." Minor revisions that meet the criteria for categorical exclusions (550 FW 3.3C) will require only an Environmental Action Memorandum. We must fully review and revise this CCP every 15 years.

Development of Issues

Because the refuge is part of the CM Refuge Complex, we are addressing its management goals, opportunities, and planning issues in the larger context of the Refuge Complex, as well as in terms of the refuge's own unique location, history, and resource attributes. In developing the issues to be addressed during development of this Eastern Neck Refuge CCP, we reviewed the whole array of issues addressed during the Refuge Complex CCP process and brought forward those that were directly relevant to Eastern Neck Refuge management. We added issues identified in the 2002 and 2007 scoping phases done specifically for Eastern Neck Refuge and those that that were identified in our public participation efforts.

The CM Refuge Complex CCP planning team identified four major issue areas:

Issue Area 1. Potential effects of an expanding human population and changing demographics on Service trust resources;

Issue Area 2. Potential effects of land acquisition and refuge expansion;

Issue Area 3. Potential effects of habitat changes; and

Issue Area 4. Potential effects on floral and faunal populations.

We do not plan to acquire additional lands or expand Eastern Neck Refuge under this CCP, so we did not include a discussion on Issue Area 2. On the other hand, we noted that the CM Refuge Complex CCP does not address cultural or historic resources as an issue. A substantial number of cultural and historic resources are known at Eastern Neck Refuge, and others are likely to be found in the future. Therefore, because we need to protect those Federal trust resources while meeting our primary wildlife trust responsibilities, we identified them as a separate issue area in this CCP.

In formulating the final list of key refuge issue areas to address in this CCP, we framed them as questions for objectivity, clarity, and ease of understanding. Each is discussed in more detail in the narrative that follows.

Eastern Neck refuge key issue areas are:

Issue Area 1. How can we most effectively address ongoing threats to refuge habitats and native fish and wildlife species?

Issue Area 2. What species and habitats should be our management priority, how should we manage to benefit them, and what other environmental values can we support?

Issue Area 3. How can we address the effects of expanding human populations and increasing recreational demand in the Chesapeake Bay region on Service trust resources at the refuge?

Issue Area 4. How can we best address potential effects on cultural and historic resources?

Issue Area 1. How can we most effectively address ongoing threats to refuge habitats and species, including those from Climate Change?

There are substantive threats to the wildlife species and habitats of the refuge that must be addressed in any plan that seeks to manage refuge resources to benefit wildlife and allow wildlife-related public uses. Significant shoreline erosion threatens the integrity of the island and surrounding tidal marsh habitats. Permanent habitat loss is potentially the end result. Protecting the refuge's shoreline is our highest priority and immediate management concern. The long-term success of any management activity we propose for wildlife or refuge habitats, whether it is in wetlands or uplands, depends upon our ability to reduce shoreline erosion and tidal marsh loss. All of these concerns, and actions we take to address them, also need to be evaluated in light of long-term climate change impact predictions. Rising sea level, rising air and water temperatures, increased intensity of storm events are a few of the major changes that could influence the future integrity, diversity, and health of our habitats and the species that depend on them.

Two invasive species: Japanese stiltgrass (on forest floor) and mile-a-minute

USFWS

Pollutants and erosion also threaten the submerged aquatic plants and shallow water habitats that support waterfowl and other species in the lower Chester River basin near the refuge. Invasive plants threaten refuge tidal marsh and upland habitats. We address this issue area through our management objectives and strategies under goals 1 and 2.

Invasive and exotic species are also a current threat to refuge habitats. Much of the refuge's uplands are inundated with numerous invasive or exotic plants that outcompete native vegetation. The loss of native vegetation compromises the habitat quality for many wildlife species.

How can we best mitigate shoreline erosion and wetland loss?
Past studies have shown that the Bay shoreline is severely eroding in many areas (USACOE 1986, VIMS 1977, Singewald 1946). Particularly hard hit are the islands off the Upper Eastern Shore of the Bay. Since colonial times, at least 10,800 acres have been lost in the middle-eastern portion of the Bay alone. The shoreline recession rates of many islands exceed 10 ft per year, with an associated load of approximately 2,500 tons of sediment per mile annually entering the Bay (Offshore and Coastal Technologies 1991).

Loss of brackish tidal wetlands is occurring along the refuge shoreline due to erosion. This has been mitigated on the bayside by a recent Army Corps of Engineers project that placed a series of breakwaters with small inlets, behind which vegetation restoration is underway. In an area restored with clean dredge spoil material, volunteers planted *Spartina alterniflora* and other wetland grasses in an attempt to improve the habitat, restore lost wetlands, and reduce future erosion.

Erosion on the Chester River side threatens SAV beds and the island, particularly at Hail Point. Hail Point Marsh, which is designated as a Research Natural Area (RNA), provides 130 acres of undisturbed marsh for waterfowl and

other wildlife. It is also a concentration area for a significant number of monarch butterflies migrating through the area each year.

In 2009, a "living shoreline" restoration project was initiated to try to stem erosion. A monitoring program is in place to document the effectiveness of restoration activities. Our discussion below about predicted climate change impacts describes further challenges related to addressing erosion and loss of wetlands.

How can we protect and restore submerged aquatic vegetation (SAV) and shallow water habitat?
Water clarity and SAV health at the refuge also are being impacted, and some of the most important waterfowl wintering habitat in the region is being lost. The presence of SAV beds is one of the most significant determinants for sustaining waterfowl populations. Unfortunately, these beds are very susceptible to pollution, poor water quality, and shoreline erosion escribed above. Nutrients entering the Chester River from farm fields, septic systems, and other sources stimulate algae growth, which blocks sunlight required by SAV for photosynthesis. Subsequent plant decay consumes the water's dissolved oxygen — a process that can result in "dead zones" where oxygen-dependent organisms can no longer survive. A bi-weekly water quality monitoring program was instituted in 2003 on the refuge at Bogles Wharf. The most significant parameter of the water quality testing program is turbidity which impacts the health of SAV and dependent biota.

Unless the related problems of erosion and SAV loss are addressed, the refuge's value as a natural environment within the Bay will severely diminish. Actions we can take to address this problem effectively and efficiently, and what level of resources we can commit to this issue, are included in chapter 4.

What are the best strategies to control invasive and exotic plants and animals on the refuge?
Non-native or exotic plants introduced from other parts of the world or other parts of the country have degraded many natural ecosystems and are a major problem for the refuge. Invasive plants can spread rapidly, smothering or out-competing native vegetation. Ecosystems impacted by invasive, non-native plants have a reduced ability to clean air and water, stabilize soil, buffer floods, and provide wildlife food and shelter.

Invasive plants at the refuge are a significant problem; they are established on over 50% of refuge lands. These plants are prolific, often overtopping and choking out other plants and depleting or eliminating valued wildlife habitats. The refuge currently has 15 species of invasive plants; four considered as species of concern: mile-a-minute, *Phragmites*, Johnsongrass, and Canada thistle weed. Invasive species of concern are actively controlled; the refuge tracks the spread and control of invasive plants utilizing Geographic Information Systems (GIS), Global Positioning Systems (GPS), permanent vegetation monitoring plots, and photo points. In 2006, 400 out of a reported 1,250 acres of land infested with invasive plants were treated on the refuge. Treatment successfully controlled invasive plants on 50 of these 400 acres.

We are currently studying the effectiveness of a series of control measures on five invasive plant species by monitoring for five seasons (summer/fall) post treatment from 2007 to conclude fall 2011. At issue is how we can most effectively and efficiently utilize limited refuge resources to control invasive plant species. Total eradication is probably not possible for many species. Mile-a-mile and *Phragmites* are the most problematic at the refuge in terms of their impacts on

native environments. Some species, such as Japanese honeysuckle, are exotic and may be somewhat invasive, but may not directly impact refuge management objectives. Invasive plant control actions are included in chapter 4, "Management Direction and Implementation," in the section, "General Refuge Management," and in the strategies for objectives 1.1.2, 1.3.1, 1.3.2, and 2.1.3.

Please refer to chapter 3, "Refuge and Resource Descriptions," for a more detailed discussion of the mile-a-minute and *Phragmites* problems on the refuge.

As we mentioned in chapter 1 under the discussion on the "Mute Swan in the Chesapeake Bay: A Bay-wide Management Plan", invasive, exotic mute swans were identified as one of the highest ecological concerns among conservation partners. Their ability to out-compete native waterfowl for food and nesting habitat can result in significant resource impacts. We describe these impacts and our plans for controlling this species in chapter 4, "Management Direction and Implementation – General Refuge Management."

What actions can Service staff implement on refuge lands to minimize the projected impacts to habitats and species from global and regional climate change?

Climate change is an issue of increasing public concern because of its potential effects on land, water, and biological resources. The issue was pushed to the forefront in 2007 when the Intergovernmental Panel on Climate Change (IPCC), representing the world's leading climate scientists, concluded that it is "unequivocal" that the Earth's climate is warming, and that it is "very likely" (a greater than 90 percent certainty) that the heat-trapping emissions from the burning of fossil fuels and other human activities have caused "most of the observed increase in globally averaged temperatures since the mid-twentieth century" (IPCC 2007). According to the Northeast Climate Impacts Assessment team, "continued warming, and more extensive climate-related changes to come could dramatically alter the region's economy, landscape, character, and quality of life" (NECIA 2007).

Other predicted major climate-related changes beyond warming air temperatures, include changing patterns of precipitation, significant acceleration of sea level rise, changes in season lengths, decreasing range of nighttime versus daytime temperatures, increasing water temperatures, declining snowpack, and increasing frequency and intensity of severe weather events (NECIA 2007). In the Chesapeake Bay region, the implications of sea-level rise are the most disconcerting within the next few decades. According to the National Wildlife Federation in their technical publication "Sea-Level Rise and Coastal Habitats in the Chesapeake Bay Region (2008)," the Chesapeake Bay region "…is one of the most vulnerable places in the nation to the impacts of sea-level rise."

The ramifications of sea-level rise in the bay area, most notably erosion and saltwater intrusion, are exacerbated by the low-lying topography, growing coastal population, and the naturally-subsiding coastal lands (NWF 2008). The EPA reports that in the region, erosion rates caused by sea-level rise will be "… higher than those that have been observed over the past century" (EPA 2009). Of increasing concern is that fact that rising sea-level is causing saltwater intrusion into estuaries and freshwater areas, reducing the diversity and extent of saltmarsh habitat, killing trees and other vegetation, and threatening many plant and animal species dependent on a certain level of salinity (NWF 2008). The ability of saltmarsh to migrate inland, or establish at higher elevations as sediment builds up in other areas, is severely hampered by the level of development and shoreline armoring that has occurred in many areas of the Chesapeake Bay.

Since wildlife species are closely adapted to their environments, they must respond to climate variations, and the subsequent changes in habitat conditions, or they will not survive. Unfortunately, the challenge for wildlife is complicated by increases in other environmental stressors such as pollution, land use developments, ozone depletion, exotic species, and disease. The NWF reports that a decline in saltwater marsh, and SAV and eelgrass beds will adversely impact the nursery and spawning habitat of many fish species, shellfish beds, waterbird and waterfowl wintering and breeding habitat, and aquatic mammals and reptiles such as Federal-listed sea turtles, the endemic diamondback terrapin, beaver and otter.

Many wildlife professionals and conservation organizations recommend we manage refuge lands using an adaptive management framework, and increase biological research, monitoring and inventories. According to the NWF, these actions are important for land managers to undertake in order to reduce our vulnerability and to build in the flexibility to effectively respond to the uncertainty of future climate change effects. Ultimately, we hope our management will reduce environmental stressors, provide support for self-sustaining populations, and ensure widespread habitat availability through land protection and conservation.

Issue Area 2. What species and habitats should be our management priority, how should we manage to benefit them, and what other environmental values can we support?

The refuge contains about 1,200 acres of upland habitats, 1,000 acres of wetlands, and approximately 80 acres of open water supporting a wide diversity of native plant and animal species. Chapter 3, “Refuge and Resource Descriptions”, describes the habitat types and associated species in detail.

Our mandated Service management priority is to protect and sustain Federal trust resources including wetlands, migratory birds, endangered and threatened species, and interjurisdictional species. With that general requirement in mind, we need to decide how best to meet the needs of the particular priority species present on the refuge and the habitats that sustain them. To facilitate that decision making, we conducted a habitat management workshop on January 17, 2007, that convened biologists and resource managers from Federal and State agencies, and the academic and research community. The results of that workshop are reflected in these issue discussions. We address this issue area through our objectives and strategies under goal 1.

What Species should be our Management Priority?

Waterfowl

Most wildlife biologists and stakeholders at the January 17, 2007, meeting believed the focus of wildlife management at the refuge should continue to be for the benefit of migratory and wintering waterfowl. The refuge was established to host a large variety of migratory birds, particularly waterfowl, and is a major staging and over-wintering area for tundra swans. The refuge’s marshes and surrounding waterways host waterfowl year round, including one percent of the world’s tundra swan population.The AP Canada geese are a focal species on the refuge. The Chester River over-winters approximately 100,000 AP Canada geese — more than any other area on the East Coast. Thousands of those Canada geese utilize the refuge, which offers sustenance as well as sanctuary. This population was once considered the largest Canada goose population in North America and the staple of waterfowl hunters in the Atlantic Flyway. Winter indices approached one million birds by the mid-1980s and annual harvests often exceeded those of any duck species. However, between 1986 and 1995, the wintering Canada geese in the Atlantic Flyway declined from 900,000 to 650,000 although numbers of “resident” Canada geese increased.

Breeding surveys of nesting areas in northern Quebec documented a more precipitous decline in AP Canada goose numbers from 118,000 nesting pairs recorded in 1988 to 90,000 in 1993, 40,000 in 1994, and 29,000 pairs in 1995. This dramatic change in numbers of AP geese, greater than 75 percent in less than a decade, prompted State, Federal, and Provincial wildlife agencies in 1995 to suspend the sport hunting season of AP Canada geese in the United States and in the Canadian Provinces of Ontario and Quebec. Since the ban was placed on sport hunting during the 1995 hunting season, the status of AP Canada geese appears to have improved substantially from the low of 29,000 pairs estimated in 1995 (Serie and Hindman, 1997).

Our task was to determine the amount of resources we should commit to benefiting waterfowl, and what specific management actions we should undertake to achieve the greatest benefit.

Federal-Listed, or Recently De-listed, Endangered and Threatened Species
The Endangered Species Act clearly mandates that we manage for Federal-listed species. Refuge lands contributed to the recovery of the peregrine falcon and the Chesapeake Bay bald eagle populations. Both species have been removed from the Federal list, but they are still afforded protection under migratory bird laws. Presently, the only Federal-listed species occurring on the refuge is the endangered Delmarva fox squirrel (DFS).

In conjunction with other Service experts we explored the potential to undertake recovery efforts for the Federal threatened northeastern beach tiger beetle and Puritan tiger beetle, but there appears to be limited potential for recovery on the refuge due to a lack of suitable habitat. Should we learn more in the future, we would reconsider implementing efforts for those two species.

Bald Eagle. In 2006, Eastern Neck refuge provided nesting habitat for seven active pairs of bald eagles. Current management actions include inventory and monitoring of nesting pairs, protection of nest trees, and prohibiting human disturbance to nesting pairs. Because the refuge supports nesting bald eagles, we can continue our role in supporting eagle productivity. There may also be opportunities to expand our role for wintering and roosting eagles.

Our task was to determine what we can effectively do to benefit this species, including active management, monitoring or additional inventories.

Delmarva Fox Squirrel. We describe in chapter 3, “Existing Environment” the history of DFS management on the refuge. The introduced refuge population peaked in the 1970’s and early 1980s, but is now close to zero. Over the last five years, we have not pursued active management for this species because refuge staff and the DFS Recovery team determined actions were ineffective. In addition, together with the Recovery Team, we have recently determined that supplementing the refuge population through translocations of squirrels back onto the refuge is an action not deemed essential to DFS recovery and would be more effective in other locations within its range.

Our task, however, was to work with the Recovery Team to determine what level of monitoring or inventory effort should be in place to protect those that remain. We will continue to consult with the Service’s Chesapeake Bay Ecological Services Office and other members of the Recovery Team to remain current on this species’ recovery and any future role the refuge could play.

Interjurisdictional Aquatic Species
Fish in rivers and coastal waters move across boundaries of states and nations; individual governments are unable to effectively manage or conserve these interjurisdictional fisheries. To coordinate actions of multiple governments,

interjurisdictional organizations have been formed voluntarily, by treaty, or by act of Congress. The Service, through the Fish and Wildlife Management Assistance program, works cooperatively with these organizations to conserve, restore, and manage fish stocks and the habitat on which they depend. In coastal waters, organizations like the Atlantic States Marine Fisheries Commission were formed by Congress to address interstate fisheries issues.

The Atlantic States Marine Fisheries Commission (*http://www.asmfc.org/*) was formed by the 15 Atlantic coast states in 1942 in recognition that fish do not adhere to political boundaries. The Commission serves as a deliberative body, coordinating the conservation and management of the states shared near shore fishery resources — marine, shell, and anadromous — for sustainable use.

The Commission's Interstate Fisheries Management Program (ISFMP) began in 1981, with the signing of a cooperative agreement with the National Marine Fisheries Service (NMFS). Currently, the ISFMP coordinates the conservation and management of 22 Atlantic coastal fish species or species groups.

American eel	Horseshoe crab	Spot
American lobster	Northern shrimp	Spotted seatrout
Atlantic croaker	Red drum	Striped bass
Atlantic herring	Scup	Summer flounder
Atlantic menhaden	Shad and river herring	Tautog
Atlantic sturgeon	Spanish mackerel	Weakfish
Black sea bass	Spiny Dogfish & Coastal Sharks	Winter flounder
Bluefish		

For species that have significant fisheries in both State and Federal waters (i.e., Atlantic herring, summer flounder, Spanish mackerel), the Commission works cooperatively with the relevant East Coast Regional Fishery Management Councils to develop fishery management plans. The Commission also works with NMFS to develop compatible regulations for the Federal waters of the exclusive economic zone.

The Chester River provides spawning and nursery habitat for 9 anadromous fish species and 12 interjurisdictional species, 2 of which have State of Maryland endangered species status (FWS & MDFRO 2006).

Horseshoe crab, an interjurisdictional species, is known to spawn in shallow waters on the refuge. Blue crab is another interjurisdictional species found in the Chester River. Spawning for this species occurs during the summer in the shallow waters surrounding the refuge.

We plan to work with our partners to enhance habitat for these species.

State Species of Concern
The Maryland WDCP (also referred to as the Wildlife Action Plan) lists 502 species of greatest conservation need—that is, fish, amphibian, reptile, bird, mammal, and invertebrate species with small or declining populations or other characteristics that make them vulnerable. Of these, 161 are Maryland State-listed threatened or endangered species.

One example of a species of elevated concern is the diamondback terrapin. Once abundant within the Chesapeake Bay, northern diamondback terrapins are facing a decline resulting from loss of nesting habitat due to waterfront development, erosion control measures, and invasive species; loss of SAV beds providing foraging habitat; commercial harvesting in the areas in which terrapins reside during winter months; mortality from boating and fishing (physical impacts and by-catches); and rising predator populations. Terrapins represent an active commercial fishery managed by the MD DNR. In 2006, emergency legislation

was passed to place new restrictions on terrapin harvest. These restrictions included the banning of winter scraping of hibernacula, the limitation of the terrapin harvest from August to October, and the setting of a slot size limit on the catch. The slot limit protects large females from harvest, but unfortunately, allows capture of smaller terrapins including males.

Our task was to determine what the role of the refuge has in enhancing habitat for these species, in partnership with Maryland DNR.

What Habitats should be our Management Priority?

Managed Waterfowl Habitats

The refuge's croplands, moist soil units (MSUs) and green tree reservoirs (GTRs) are managed to sustain migrating and wintering waterfowl. MSUs are low-lying, naturally wet, non-forested areas where water is impounded seasonally. On the refuge, late summer precipitation is held by earthen berms to create flooded areas, primarily to benefit fall migratory and wintering waterfowl, and to a lesser extent shorebirds and wading birds. Decomposing vegetation and invertebrates provide a rich foraging area. GTRs are forested lowlands that are temporarily flooded during the fall and winter to attract waterfowl. Flooding occurs when trees are dormant, but when waterfowl are still present and can forage on the acorns and seeds, and macro-invertebrates. Water control structures in GTR areas allow water levels to be manipulated.

Croplands. Currently 557.1 acres of rotational croplands provide habitat for migrating and wintering waterfowl, particularly Canada geese, black ducks, mallards, pintails, and teal. The crop rotation and management practices we use on the refuge's croplands are described in chapter 3, "Refuge and Resource Descriptions". There is controversy about the value to wildlife of maintaining croplands on the refuge as opposed to other less-intensively managed habitat types which could provide waterfowl feeding habitats. Opinions vary as to the amount and distribution of farm fields, the vegetative cover used on the borders between fields, and the particulars of cooperative farming methods. Some people questioned whether this management is consistent with the goals for other refuge resources.

The objective of cropland management on the refuge is to provide extremely important migrating and wintering habitat for the Canada geese, black duck and other waterfowl. The reduction in native foraging plants, such as wild rice and SAV, instigated a program to provide supplemental "high energy" forage, especially during harsh winters and during hunting seasons. The combination of providing an area closed to hunting with readily available forage is a huge attraction for waterfowl. Over the past 2-3 decades, the extent and distribution of the refuge's crop fields was also designed to provide habitat for DFS. Experts had recommended a 2:1 forest to crop ratio as optimal for the squirrels. Now that we propose to no longer focus active management for DFS, we are revising the design of our current cropland management program to focus on benefits for Canada geese and other waterfowl.

Green Tree Reservoirs and Moist Soil Units. The refuge's 38 acres of GTRs provide feeding habitat for wintering and migratory waterfowl, including wood ducks, mallards, black ducks, and teal. In addition, there are currently 30 acres of managed and unmanaged MSUs for Canada geese, black ducks, mallards, teal, and pintail. Conservation organizations such as Ducks Unlimited have advocated for an expanded program, in particular, increasing the acreage and number of moist soil units. Advocates suggest that, in addition to waterfowl benefits, these units can be managed to provide important shorebird and water bird migration habitat. Other opinions expressed include the desire for a reduction in actively managed habitat and a shift in focus to managing for what would be considered

naturally occurring native plant communities typical of Maryland's Eastern Shore and the wildlife those plant communities would sustain.

Forest Habitats
Prior to European settlement, the Eastern Shore was heavily forested. The predominant forest type was hardwood, most likely oak-hickory, oak-gum, or oak-pine type and increasingly mixed with pine toward the south. Large patches of pine-dominated woods exist today but are largely second-growth forest due to extensive clearing since European settlement. Very little original forest, or "old growth," exists in the region today.

Eastern Neck refuge contains approximately 708 acres of forested land, comprised primarily of loblolly pine, hardwoods, and mature oak-sweetgum forest. Forested acres occur in relatively small forest stands scattered throughout the Island and are interconnected by hedgerows consisting primarily of black cherry and locust. Forest stands range from one to more than 100 years old, and function as buffer zones and corridors utilized by a variety of species. Forested refuge land also provides nesting trees and roosting areas for the bald eagle, and for two high priority PIF species — wood thrush and Eastern wood pewee, and for six moderate- or low-priority PIF species.

Because of the interspersion of other cover types, there are no relatively large contiguous blocks of 100+ acres of forest that would help support forest-interior dwelling (FIDS) birds that prefer such habitat (see text box). Service migratory bird experts suggest that because of the island's isolation, even if it were totally forested, it would contribute limited FIDS breeding habitat and would not be a regionally significant contributor to sustaining FIDS populations (Dettmers pers comm. 2007). Our task was to prescribe an amount and distribution of forest habitat on the refuge, with emphasis on larger, contiguous forested areas, and intact riparian and shoreline buffers.

FIDS Habitat Criteria

The Chesapeake Bay Critical Area Program was established in 1984 with the passage of the Critical Area Act in the State of Maryland. The law mandated the development of regulations (Critical Area Criteria) to protect water quality, conserve plant and wildlife habitat and direct growth and development. One of the requirements of the Criteria is the protection and conservation of breeding habitat for forest interior dwelling birds (FIDS) (CAC 2001). The Criteria identify two FIDS habitat types for which conservation is mandated:
(1) Existing riparian forests (for example, those relatively mature forests of at least 300 feet in width which occur adjacent to streams, wetlands, or the Bay shoreline, which are documented breeding areas)
(2) Forest areas utilized as breeding areas by forest interior dwelling birds and other wildlife species (for example, relatively mature forested areas within the Critical Area of 100 acres or more, or forest connected with these areas)
Although both habitat type descriptions mention minimum areas, some smaller forested areas may also support FIDS as well, depending on the characteristics of the forest tract and surrounding landscape. FIDS habitat may be absent in forests larger than 100 acres. Therefore, in addition to considering the acreage of a forest when identifying potential FIDS habitat, forest characteristics like forest age, shape, forest edge-to-area ratio, vegetative structure and composition, topography and degree of human disturbance should be taken into consideration as well as the character of the surrounding landscape, including proximity to large forested areas, percent of contiguous forest in surrounding area, habitat quality of nearby forest tracts and adjacent land uses (CAC 2001).

Other Potential Habitat Values
An additional directive for achieving refuge purposes and the Refuge System mission is related to biological integrity, diversity, and environmental health (BIDEH). This requires that we consider and protect the broad spectrum of native fish, wildlife, plant, and habitat resources found on a refuge:

> "In administering the System, the Secretary shall…ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans…" (Refuge Improvement Act, Section 4(a)(4)(B)).

The *Policy on Biological Integrity, Diversity and Environmental Health* (601 FW 3.3) is the Service's statement of how it will implement this mandate. The policy provides information and guidance to manage refuges in such a way as to prevent degradation of BIDEH. It also offers ways to restore lost or severely degraded ecological components, where appropriate.

The policy explains the relationships among BIDEH, the NWRS mission, and refuge purposes as follows:

> "…each refuge will be managed to fulfill refuge purpose(s) as well as to help fulfill the System mission, and we will accomplish these purpose(s) and our mission by ensuring that the biological integrity, diversity, and environmental health of each refuge are maintained, and where appropriate, restored." (601 FW 3[3.7B]).

At the refuge, within a landscape that has been managed for centuries, we needed to consider ways to meet our biological integrity, diversity and environmental health mandate. Could we enhance our capabilities through research and demonstration projects? Could we maintain a diversity of habitats of substantive benefit to wildlife?

Small grassland and shrubland areas on the refuge add to refuge habitat diversity and to overall refuge biodiversity, but we needed to determine to what extent resources devoted to their management would be of substantive value to Federal trust species or other species of concern. We considered to what extent we should divert resources and habitat space that would otherwise support waterfowl and their habitats to manage for this diversity.

Grasslands. We currently maintain approximately 31 acres of grasslands, primarily in one field near the former refuge headquarters, which we plant with native grasses and wildflowers to benefit migratory butterflies, particularly the monarch butterfly, as well as grassland songbird species and birds of prey. We have conducted prescribed burning to help maintain these grasslands, rather than letting them convert to shrub habitat. Large expanses of grasslands are crucial for grassland dependent species such as the eastern meadowlark and the grasshopper sparrow. Grasslands are in limited availability throughout the region, and therefore many grassland bird species have been in decline throughout the east. Refuge lands, however, have limited capability to provide productive grassland bird habitat of this size for those species. Many people advocate maintaining the fields near the former headquarters as a wildlife viewing area due to the concentrations of butterflies. Thus, we needed to consider to what extent Eastern Neck Refuge should continue to provide this habitat.

Shrublands. Approximately 18 acres of upland and wetland shrub habitat occurs on the refuge. Upland shrub habitat is primarily associated with field hedgerows or the early stages of forest development. Shrubland bird species, such as the yellow-breasted chat and white-eyed vireo, are documented on the refuge, but are not thought to be well-distributed or densely populated. Some biologists advocate that we expand upland shrub habitat on the refuge, beyond that provided by hedgerows, due to the increasing number of breeding and migrating birds of conservation concern that rely on this habitat. However, there is also concern that maintaining shrubland in hedgerows would exacerbate the already major

problem of invasive plants, such as mile-a-minute, that prefer those areas and also contribute to further fragmenting the croplands important to wintering waterfowl. Some shrub habitat is created as we pursue those forest objectives that transition fields to forest, but it is only transitional or temporary until trees establish.

Wetland shrub-scrub habitat, comprised of hightide bush, bayberry, and wax myrtle, exists along all forest and marsh fringe areas and other high areas throughout the tidal marsh. This may constitute a sufficient acreage to maintain this habitat diversity component without active management. In the uplands, however, maintaining a permanent, healthy, native shrub community would likely be labor intensive and expensive. Thus, we needed to decide whether the benefits of actively managing for this habitat support the effort.

How can we enhance research opportunities at the refuge to help us to make better refuge management decisions?
We believe that support of high quality scientific research related to our management concerns should continue to be a significant part of our mission on Eastern Neck Refuge. Unfortunately, limited research is presently occurring. The refuge's unique and rich resources, however, provide great opportunities for further study. Furthermore, Hails Point Marsh is designated as a Research Natural Area, and the refuge and surrounding waters are listed as a Wetland of International Importance by the RAMSAR Convention. See chapter 3, "Refuge and Resource Descriptions," for additional details on the RAMSAR listing.

Many conservation land managers are concerned by the lack of scientific data available about wildlife populations, their habitats, and effects of management actions needed to inform decision-making. This is particularly important to support adaptive management programs, when habitat-specific rather than species-specific management is being emphasized, when promoting biodiversity has become an almost universal management goal, when long-term ecological monitoring is considered a critical component by the scientific community, and when the occurrence of rare species is of both public and regulatory interest. Public comment encourages the refuge to conserve and restore natural habitats, and to monitor conditions in partnership with state agencies, other Federal agencies, NGOs, universities, and research institutions.

We received recommendations that we should pursue a more active research, inventory and monitoring program. Four specific information gaps were identified and there were recommendations that we implement the following:

9) A baseline inventory of the occurrence and spatial distribution of flora and selected fauna;

10) A long-term monitoring program to determine climate change-related trends in selected flora and fauna;

11) An adaptive management program to guide significant habitat and population management actions;

12) Detailed research into habitat-species relationships. Some of the more obvious relationships for investigation are waterfowl use of managed refuge habitats and habitat requirements for species of conservation concern.

Our task was to determine to what extent we could facilitate research over the next 15 years, and what research studies should be a priority for the refuge.

What demonstration projects should we continue to support?

Resources are limited and some people claim that we should focus where the greatest long term benefit to resources and society is predicted. We heard a range of opinions on whether or not to dedicate limited resources in continuing to promote the refuge as a demonstration area, principally for renewable energy and green business practices, best management farming and forestry practices, and shoreline and habitat restoration for habitat diversity.

During the planning process, we evaluated whether to modify those demonstration projects. We also evaluated opportunities for new programs related to freshwater impoundments and invasive plant management. The refuge's BayScape project, which is part of a regional program that promotes native, regional vegetation attractive to wildlife and requires minimal input of water and chemicals, could be better promoted. Our plans for each of these programs are outlined in chapter 4.

Issue Area 3. How can we address the effects of expanding human populations and increasing recreational demand in the Chesapeake Bay region on Service trust resources at the refuge?

The Bay region's rapid population growth has led to increasing demand for outdoor oriented recreation on Maryland's Eastern Shore. In 2007, the refuge provided more than 55,000 visitors the opportunity to learn about and view waterfowl, rare species, and other wildlife. This visitation has been accompanied by increasing occurrences of unintentional and sometimes deliberate disturbance of wildlife and damage to refuge resources and property.

Our task was to determine the level and mix of recreational opportunities to allow, while still protecting wildlife resources .We address this issue area through our objectives and strategies in chapter 4, under goal 3.

How can we maintain or expand recreational, interpretive and educational opportunities on the refuge given our limited resources?

Managed as part of the CM Refuge Complex, Eastern Neck Refuge shares staff and funding resources with the other refuges in the Refuge Complex. Appendix D includes the current, approved staffing chart for the CM Refuge Complex and identifies which positions would be housed at Eastern Neck Refuge. Our task in developing the CCP was to determine how best to develop wildlife, habitat, and visitor services programs based on this anticipated staffing level, including our capability to enforce regulations. Ultimately, however, decisions on staffing are decided by the Project Leader for the Refuge complex.

We heard recommendations for increased access, more trails, more parking, and better designed boat launch sites. Environmental education was the most requested program; specifically, expanding partnerships with educational institutions was recommended.

How can we best address unauthorized uses or damage to refuge property?

Control of illegal access by boaters

Boat launching facilities at Bogles Wharf and Ingleside allow legal access for motorized and non-motorized watercraft to the Chester River and Chesapeake Bay. However, access to the refuge along its 15 miles of shoreline is restricted because boat landings can cause shoreline erosion, habitat damage, wildlife disturbance, including, disturbance to nesting bald eagles. Our challenge was to determine how best to develop effective outreach and education programs about closed areas, and in turn, enforce those regulations. One example is the recent development of a self-guided kayak trail around the island includes interpretive signage that enhances the viewing experience along the shoreline, while also warning against encroachment and landings at unauthorized locations.

Control of vandalism at the north end of the refuge

County Road 445, locally known as Eastern Neck Road, where it heads south onto the refuge at the Eastern Neck Narrows bridge and ends at Bogles Wharf, provides access to the northern 1/4 of the refuge from official sunrise to official sunset seven days a week. Continuing south, just beyond the Bogles Wharf turn-off, the road has a gate which is typically open between 7:30 am and ½ hour after official sunset. Without regular monitoring and enforcement, the ungated road on the northern portion of the refuge essentially provides unrestricted access to that section of the refuge and has led to incidents of damage to refuge property, including damage to the wildlife observation tower at Turkey Cove, damage of facilities at the Tundra Swan boardwalk, and of littering and campfires by picnickers away from authorized locations.

Our challenge was to determine how best to conduct effective monitoring and law enforcement of these sites given our resource limits.

Issue Area 4. How can we best address potential effects on cultural and historic resources?

The refuge has a rich history of Native American habitation and, since the time of European settlement of the Bay region, as a center of fishing and shellfishing activities on the Bay, commerce on the Chester River, and farming and waterfowl hunting. The refuge has many identified cultural sites. Unfortunately, we do not have a complete inventory for the refuge. Primarily, we have been surveying specific project areas before we implement any action, so the current inventory areas are scattered across the refuge.

Among the substantive concerns we will continue to address with respect to cultural and historic resources are:

1) Effects of shoreline erosion on archeological sites
2) Looting of archeological sites
3) Maintenance of historic structures

Because Federal laws protect these cultural resources these issues are addressed through our objectives and strategies under goal 1.

How can we protect archaeological sites that are uncovered along the unstable refuge shoreline?

Not only does shoreline erosion threaten the physical integrity of the island and its wildlife habitats, but it also threatens exposure and loss of archaeological sites or artifacts. We address shoreline erosion under goal 1 by identifying actions to pursue to stabilizing the shoreline. However, recovery and stabilization can be a long process and some continued loss is anticipated.

During the course of implementing shoreline protection projects, we may discover new archeological sites or artifacts. In addition, refuge staff and/or visitors may locate new ones at any time. We will make sure that steps are taken to follow proper procedures for recording and disposition of any new sites or artifacts located.

How can we best identify and protect archeological resources on refuge lands?

Artifact collecting was a common activity prior to refuge establishment. However, this practice is not allowed on refuge lands as it violates Federal laws protecting historic and cultural sites. When an artifact is removed from its original location, both the object and its context are lost.

Since all of the sites and artifacts on the refuge are now protected by Federal and State law, visitors are instructed that if they discover any artifacts on the refuge, to leave the object in place and report its location to the refuge staff.

Unfortunately, looting remains an occasional issue. We will continue to be vigilant about its enforcement to the best of our capabilities.

How do we maintain the historic buildings, proposed or listed on the National Register, in keeping with their historic character, but also making them functional to our needs?
The current refuge headquarters is eligible for National Historic Register listing and is being carefully rehabilitated to preserve its historic character. This rehabilitation is very expensive and funding its long-term maintenance is also a concern. We will continue to seek funding and implement projects to protect its integrity.

Chapter 3

USFWS

Breakwater marsh restoration

Refuge and Resource Descriptions

Introduction

This chapter identifies the national and international importance of Eastern Neck Refuge. It also describes its regional setting, including the natural and human environments of the Chesapeake Bay (Bay) and Chester River ecosystems which affect the refuge and its resources. Finally, this chapter describes the refuge's natural and cultural resources, visitor services and other programs, and its facilities.

National and International Importance

Eastern Neck Refuge is nationally and internationally important for wildlife in several ways. It provides important migration, breeding, and wintering habitat for migratory birds, namely waterfowl, along the Atlantic Flyway. The waters surrounding the refuge are a staging area for one percent of the world's population of tundra swans, which is one reason the refuge has been designated as a Globally Important Bird Area by the American Bird Conservancy (ABC). The ABC's Important Bird Areas Program identifies and documents the world's most significant sites that serve as a link along a migratory bird pathway or that support significant populations of endangered, threatened, Watch List bird species, or bird species with a limited range. Sites may also be designated as Important Bird Areas if they—like Eastern Neck Refuge—support significant populations of breeding, migrating, or wintering birds, including waterfowl, seabirds, wading birds, raptors and landbirds.

The Bay estuary, with its component wetlands that include the tidal marshes of the refuge, is listed on the Ramsar List of Wetlands of International Importance. The Ramsar List was established in response to Article 2.1 of the Convention on Wetlands (Ramsar, Iran, 1971), which reads:

> *"Each Contracting Party shall designate suitable wetlands within its territory for inclusion in a List of Wetlands of International Importance, hereinafter referred to as "the List" which is maintained by the bureau [secretariat of the Convention] established under Article 8."*

The Convention establishes that "wetlands should be selected for the List on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology."

Wetlands on the RAMSAR list are recognized by the international, and respective national, community as being of significant value not only for the countries in which they are located, but on a global scale as well (Ramsar Convention 2007).

Regional Setting

Eastern Neck Refuge is an island situated at the southern tip of Kent County on the Upper Eastern Shore of the Chesapeake Bay in Maryland (see map 1.2, Chapter 1) at the confluence of the Chester River and the Bay. It is on the Delmarva Peninsula, which includes Delaware and the portions of Maryland and Virginia east of the Bay. The refuge is also located in the Mid-Atlantic Coastal Plain Physiographic Area.

The Chesapeake Bay

The Chesapeake Bay, the largest and most biologically diverse estuary in the United States, is home to more than 3,600 species of plants, fish, and animals. For more than 300 years, the Bay and its tributaries have sustained the region's economy and defined its contemporary traditions and culture. It is a resource of extraordinary productivity and beauty that merits the highest levels of protection and restoration. Accordingly, in 1983, 1987, and 2000, the States of Virginia, Maryland, and Pennsylvania, the District of Colombia, the Chesapeake Bay Commission, and the U.S. Environmental Protection Agency (EPA) signed historic agreements that established the Chesapeake Bay Program (CBP) partnership to protect and restore the Bay's ecosystem. The refuge plays an

important role in supporting the Chesapeake Bay Watershed Partnership, and in protecting the diversity of living resources that the Chesapeake 2000 Agreement was developed to protect. In a regional context, the refuge hosts a vital part of the Bay's living resources and is an important factor in protecting the entire natural system.

Approximately half of the Bay lies in the State of Maryland; the other half in the Commonwealth of Virginia. It is the largest (2,500 square miles) and the longest (195 miles) estuary in the U.S., with the greatest number of tributaries (150). It has more miles of shoreline (4,000) than the entire West Coast. Its watershed encompasses more than 64,000 square miles, and more than 498,000 wetland acres.

The Bay and its tributaries provide rich grounds for commercial and recreational fisheries. Crabbing and angling are popular activities among Bay residents, and increased demand for seafood has spurred on commercial catches of many aquatic species. However, fishing pressure combined with pollution, diseases and other stressors have impacted the populations of many signature Chesapeake fish and shellfish. It is estimated that more than one-third of the nation's blue crab catch comes from the Chesapeake Bay. Blue crabs have the highest value of any Chesapeake commercial fishery, bringing in more than $50 million per year. For more than a century, oysters made up one of the Bay's most valuable commercial fisheries. Over-harvesting, disease, sedimentation and poor water quality have since caused a severe decline in their numbers. American shad once supported the most valuable finfish fishery in the Chesapeake. But stocks in the Bay and along the Atlantic coast are now low compared to historic levels and no longer support commercial fisheries (CBP 2007a).

The Chester River and Watershed

The Chester River begins in Delaware, flows west for 60 miles through Kent and Queen Anne Counties in Maryland, and then empties into the Bay. The river, which is fed by 43 tributaries and drains 390 square miles of watershed, provides habitat for a wide variety of birds, including ducks, geese, and bald eagles, as well as spawning and nursery areas for many fish species such as shad, blue-back herring, and striped bass (CRA 2006). Service and refuge staff are involved in the efforts of the Chester River Association (CRA) and Maryland's Upper Tributary Team to address the health of the river.

The refuge is located in Maryland's Upper Eastern Shore Tributary Basin at the lowest reach of the six watersheds that comprise the Chester River drainage: the Upper Chester River, Middle Chester River, Southeast Creek, Corsica River, Langford Creek, and Lower Chester River Basin (see chapter 1, map 1.3).

Climate and Weather

The influence of the Atlantic Ocean and the Bay gives the Eastern Shore generally mild winters, and summers with high humidity and relatively warm days and nights. Summer temperatures normally reach the upper 80's and occasionally climb into the 90's, although 102°F has been recorded. The daily high temperature in July averages 87°F. Winter is usually short, with an average daily low temperature in February of 26°F. The watershed has a frost-free period of approximately 183 days (CPB 1999).

From October through March, frequent high- and low-pressure systems alternate cold dry air from the north with warm humid air from the south. That pattern tends to break down in the summer, as warm moist air spreads northward from the south and southwest and remains over the area for much of the season. Intense low-pressure areas (hurricanes and "nor'easters") can bring torrential rains and winds of hurricane force to the Eastern Shore, especially during August, September, and October. Thunderstorms occur on about 28 days

each year; most occur in July. Annual rainfall averages 43 inches. The growing season for most crops also falls within that period. Normally, August is the wettest month, and October the driest (CPB 1999).

Climate Change and the Effects of Relative Sea Level Rise

Climate change has already had an observable impact in the Chesapeake Bay, including an increase in the average air and water temperatures, more extreme weather events (including flooding, droughts and heat waves) and sea level rise (NWF 2008). During the last century, air temperatures in the region have risen 1 degree Fahrenheit, while there has been a 10 percent increase in precipitation (EPA 2008). The warmer air temperatures have also correlated with warmer ocean temperatures in the Bay. In 2005 there was a major die off of eelgrass, an important habitat for blue crabs, in the Bay due higher water temperatures (CBF 2007). As noted in chapter 1, the Chesapeake Bay is extremely vulnerable to climate change and sea level rise in particular, because of natural subsidence, low-lying topography, extensive land-development and associated human population growth (NWF 2008).

Historic tide-gauge records document that sea level is rising in Mid-Atlantic waters and the Bay at an average rate of 3 to 4 millimeters (mm) per year (MD DNR 2007). There has been approximately one foot of sea level rise in the Bay over the past 100 years. This rate is nearly twice that of the global historic average, as reported in the Intergovernmental Panel on Climate Change (IPCC) report (IPCC 2007). At least half of this increase is attributable to climate change, while the remaining increase is likely due to the natural subsidence of coastal lands (NWF 2008). The natural subsidence may be accelerated by excessive groundwater withdrawals in the region (EPA 2008). Land is currently subsiding in the Bay region at a rate of approximately 0.05 inches/year resulting in significant losses to tidal and shoreline habitats. The IPCC report projects that global sea levels will rise between 7 and 23 inches by the year 2099. For Maryland waters, regional land subsidence must be factored into the equation in order to estimate relative sea level rise. This means that the State could experience an additional 5 or more inches of sea level rise, over and above what is being experienced globally, in the next 100 years. At the very least, a continuation of the current sea level rise trend (0.12 to 0.16 inches/year) or one foot over the next century is expected to occur in the Mid-Atlantic region. This is the most conservative and low-end estimate. The IPCC report documents that the global rate of sea level rise has started to accelerate. This means that Maryland could see as much as 2 or 3 feet of rise by 2099.

The rise in sea level has lead to the inundation and erosion of coastal marshes and islands throughout the Bay, including the loss of 13 small islands in the centuries since European settlement (EPA 2008). Shoreline development and armament is further exacerbating erosion of beaches and marshes (EPA 2008).

Erosion and Sedimentation

Eastern Neck Refuge has a history of severe shoreline erosion. Between 1867 and 2005, the Island lost 291 acres of land to the Bay (Cronin 2005). In the late 1980s, the refuge's western shoreline retreated by as much as 10 feet per year. Unlike barrier islands along the coast that lose shoreline on one end but gain land on the other, when Bay islands erode the material is lost to the Bay—and once lost to erosion, the islands are gone forever. Senator Barbara Mikulski was instrumental in obtaining a $2.9 million Congressional appropriation in 1989 to study, develop, and construct projects to protect the western shore of the refuge.

In 1991, a major project was initiated to place erosion control structures consisting of five stone breakwaters fabricated out of 1.5- to 3-ton stones along the refuge's western shore. The purpose of the breakwaters is to "break" or absorb the waves' energy before they reach the beach. The project involved

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Breakwater project at refuge

installing off-shore and near-shore stone breakwaters. Where bluffs are located along the shoreline, offshore breakwaters were constructed approximately 100 to 200 feet from shore. Offshore breakwaters are 75 feet long, six feet above mean high tide, and are placed 75 feet apart in a semi-circle. Where the shoreline is closer to sea level, near-shore breakwaters were constructed in dimensions similar to the offshore breakwaters. In addition to the breakwaters, the shoreline itself was also lined with small stones to absorb the energy of any waves that make it through the breakwaters' gaps. Approximately 1.5 miles (7900 ft) of severely eroding shoreline were protected by this project, which was finished in early 1993 at a final cost of $2.75 million. In 2005, dredged material from Kent Narrows—a navigation channel of the Chester River—was deposited behind the breakwaters. Despite the success of the breakwater project, elsewhere on Eastern Neck Island, shoreline erosion continues to be a problem.

In 2006, riparian land use and bank and buffer conditions were analyzed throughout Kent County by the Virginia Institute of Marine Science (Berman et al. 2006). Bank conditions (Table 3.1) were categorized as experiencing either low rates of erosion, high rates of erosion, or as "undercut." Undercut meant that erosion is apparent at the base of the bank, but that the bank face otherwise appears stable. Eastern Neck Island was surveyed in two parts—northern and southern—for the analysis. Combining the results from low (0-5 foot), medium (5-10 foot), and high (10-30 foot) bank heights, the northern end of the island is experiencing more total erosion along its length. Fortunately, no undercutting was observed. Future restoration of island shoreline depends on both funding and the availability of dredge material.

Table 3.1. Bank Height and Erosion Status (miles of shore) on Eastern Neck Island

Bank height	0-5 feet			5-10 feet			10-30 feet		
Erosion status	**Low**	**High**	**Undercut**	**Low**	**High**	**Undercut**	**Low**	**High**	**Undercut**
Northern Portion of Eastern Neck Island	8.33 miles	0.07 miles	0.00 miles	0.33 miles	0.10 miles	0.00 miles	0.23 miles	0.00 miles	0.00 miles
Southern Portion of Eastern Neck Island	7.35 miles	0.39 miles	0.00 miles	0.15 miles	0.00 miles	0.00 miles	0.00 miles	0.00 miles	0.00 miles

Source: Berman et al. 2006

Salinity and Tides

An average of 522,780 gallons of water flows into the Bay every second from all its tributary sources. Of the 150 rivers, creeks, and streams draining the watershed, 40 are considered major tributaries, and 8 of these provide 90 percent of the freshwater inflow. The Bay's northern and western tributaries contribute the greatest volume of freshwater (CBP 2009a). The Susquehanna River, which flows from the north, provides 48 percent of the freshwater in the Bay; the Potomac and James rivers, flowing west and south into the Bay, provide 19 and 14 percent respectively, of the freshwater input (Bue 1968). Although this freshwater flow only represents about 10 percent of the total seawater volume in the Bay, it has a profound influence on the estuary and its natural resources.

Salinity is highest at the mouth of the bay, where seawater from the Atlantic enters the estuary and then decreases as you travel north away from the mouth (CBP 2009b) Circulation and mixing are slow because freshwater is more buoyant than salt water. The resulting salinity contours, or isohalines, shift according to seasons of the year and freshwater input, and have significant seasonal effects on the Bay's living resources. In April, for example, salinity of the water near the Bay Bridge may be as low as 7 ppt (parts per thousand), but by October following a dry summer, the salinity can be almost twice that amount.

A natural phenomenon known as the "Coriolis force," (Persson 1998) causes flowing waters in the northern hemisphere to be deflected to the right due to the earth's rotation. This condition has a significant impact on the Eastern Shore because the saltier waters moving north up the estuary are pulled towards the eastern side of the Bay, where there is less freshwater input. The combined power of the western rivers and the Coriolis force create a counterclockwise circulation in the Bay, with the incoming salt water entering along Cape Charles and hugging the Eastern Shore, and freshwater exiting along Cape Henry and the western shore. This circulation and salinity pattern has definite influences on the estuary and its ecosystem.

Tides also have great influences on the ecosystem. The vertical range of tides in the Bay is greatest at the capes (2.5 feet), intermediate through the main Bay (2 feet), and lowest along the upper reaches of tidal streams (1-2 feet). Twice a day changing tides expose and submerge shorelines and transport nutrients. Tides also help move water through the Bay; on average, it takes a unit of water about two to three weeks to cycle along the Bay's 195-mile length.

Regional Hydrology

Unconsolidated sediments underlie the Coastal Plain, including all of the estuarine wetlands. The area derives its groundwater recharge mainly through infiltration of precipitation. Discharge occurs through seepage to streams, estuaries, and the ocean. Coastal wetlands are found in these discharge zones. These wetlands have complex hydrology, in which stream flow, groundwater flow, and tidal flow all play a part. Forested wetlands occur along the stream channels, and are sustained by local and regional groundwater flow and flooding during storms. The poorly drained interior of the Delmarva Peninsula has a system of depressional palustrine wetlands, narrow bands of palustrine wetlands along rivers and ditches that drain from inland to the coasts.

Water Quality

Section 303(d) of the Federal Clean Water Act requires Maryland to: (1) identify waters, known as water quality limited segments (WQLSs), where technology-based effluent limitations and other required controls cannot achieve water quality standards; (2) for each listed water, establish Total Maximum Daily Loads (TMDLs) for pollutants preventing the attainment of water quality standards; and (3) offer an opportunity for public review and comment on the proposed TMDLs.

As a coordinating framework for Maryland's TMDL program, the Maryland Department of the Environment (MDE) has developed a watershed cycling approach. This approach focuses on protecting Maryland's water quality by developing and implementing TMDLs in a comprehensive fashion by drainage basin (watershed). By adopting watersheds as the primary management units, MDE addresses the appropriate natural spatial domain and is able to consolidate the necessary resources with sufficient spatial focus.

An updated report from MDE (MDE 2007) compiles data collected in 1999 from Maryland's Upper Western and Upper Eastern shores. In the Upper Western Shore the major watersheds are the Lower Susquehanna and Bush Rivers. In the Upper Eastern Shore the major watersheds are the Elk and Chester Rivers.

The Chester River sub-basin drains 547 square miles of Kent, Queen Anne's and Talbot counties in Maryland to the Delaware line. More than 64 percent of the land in the Chester River sub-basin is used for agriculture; less than 27 percent of the land is forested. Urban areas comprise only seven percent and wetlands only two percent of the drainage area. Chestertown, located in the middle Chester River, is the sub-basin's largest community although the Kent Island and US Route 50 corridor extending eastward from Kent Island to Queenstown and then south to Easton are rapidly developing areas. Other major communities include Stevensville, Grasonville, Queenstown and Rock Hall.

Surface waters are classified as Use I (water contact recreation and aquatic life) or Use II (shellfish harvesting) (COMAR 26.08.02.08). For the most recent information regarding specific use classes in this watershed, the reader is referred to the Code of Maryland Regulations (*http://www.dsd.state.md.us/comar/getfile.aspx?file=26.08.02.08.htm*).

MDE routinely monitors water quality at three Bay tributary stations and at one CORE/Trend Station located in the lower Chester River. One fixed Long Term Benthic Macroinvertebrate program station is monitored for estuarine benthos in addition to randomly selected Long Term Benthic Macroinvertebrate program sites. The Maryland Biological Stream Survey (MBSS) collected water quality samples in the watershed at 39 stations in 1996 and at three stations in 1997. MDE indicated TMDLs will be developed to address the nutrient impairments to water quality in the Eastern Bay (02130501), and the Miles (02130502), Wye (02130503) and Lower Chester (02130505) Rivers, following completion of the CBP Phase V Watershed and Water Quality Model (MDE 2007).

MDE created a restricted shellfish harvesting area in Lower Chester River Basin, Southeast Creek Basin, and Middle Chester River Basin in Kent and Queen Anne's Counties, Maryland and on Sept 24, 2007 established a TMDL for fecal coliform (*http://www.mde.state. md.us/ Programs/WaterPrograms/TMDL/Pub_Notice/TMDL_PN_Chester_FC.asp.)*.

The restricted shellfish harvesting area in Chester River is located in three 8-digit basins: Lower Chester River (basin number 02130505), Southeast Creek (basin number 02130508), and Middle Chester River (basin number 02130509). These three basins were all first identified on the 1996 303(d) List submitted to U.S. EPA by the (MDE). The designated uses in Lower Chester River were listed as impaired by sediments (1996), nutrients (1996), fecal coliform in tidal shellfish harvesting portions of the basin (1996), toxics (2002), impacts to biological communities (2002, 2004), and bacteria in public beaches (2006). The TMDL of fecal coliform will allow for the attainment of the shellfish harvesting designated use in the restricted shellfish harvesting area in the Chester River mainstem.

The listings for other impairments within the Lower Chester River Basin, Southeast Creek Basin, and Middle Chester River Basin will be addressed at a future date.

The TMDL sets the maximum load limit for the impairing substance. The TMDL also reflects load allocations to point sources, nonpoint sources and a margin of safety that accounts for uncertainty in the procedures used to estimate the TMDLs. Once established by the State, the TMDLs will be subject to approval by the United States Environmental Protection Agency (EPA). The established TMDLs will support measures needed to attain water quality standards in the Lower Chester River Basin, Southeast Creek Basin, and Middle Chester River.

Bay Wetland Ecology

The Bay's salinity gradient and topography control the distribution of life and the number of species within the Bay. Within each zone, species composition varies depending on local shifts in salinity, elevation (depth), sediments, and topography of the substrate. While not all of the following Bay communities occur on the refuge, they are all important components of the ecology.

Deep Open Water

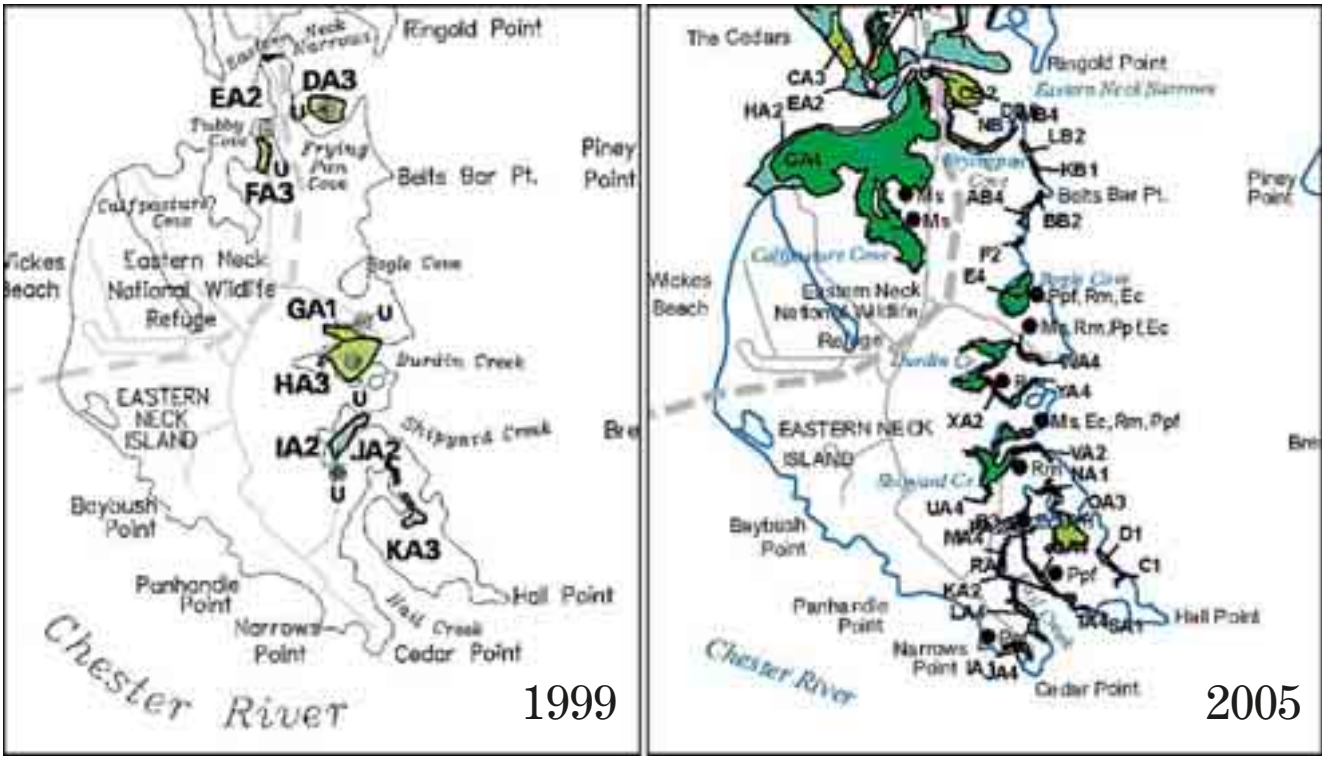
The open Bay is seasonal habitat: a summer haven for marine fishes and a winter refuge for migratory waterfowl. True estuarine species that remain in the basin year-round, such as the Bay anchovies, retreat to deepwater channels in winter. In spring, they return to forage along channel edges, and serve as prey for visiting bluefish and other large predatory fish that return from their Atlantic winter retreat. The biannual migrations of marine and anadromous fishes into and out of the Bay are well known to fishermen. Ten anadromous species migrate through the Bay to spawn in freshwater tributaries in early spring. Also, 152 marine species may visit the estuary in summer as foraging adults or juveniles, but most depart by autumn. Six marine species are regular visitors in winter. Only 27 estuarine species (and two marine species) are permanent residents. No deep water habitat occurs on the refuge.

Shallow Water Habitats

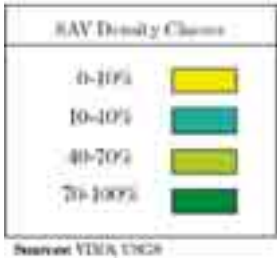
Shallow waters are where much of the Bay's remarkable productivity occurs. The Bay averages 21 feet (6.4 meters) deep. Additionally, much of the basin is covered by less than 10 feet (3 meters) of water. These shoal areas allow sunlight to reach the Bay floor, permitting photosynthesis in both the water and benthos. These shallow waters host three important plant communities: phytoplankton, benthic algae, and submerged aquatic vegetation.

Submerged Aquatic Vegetation

An important plant community, consisting of up to 15 plant species that live in shallow waters of rivers, streams, and the Bay proper, are collectively known as "submerged aquatic vegetation," or SAV. As we mentioned in chapter 1, under issue area 1, the presence of SAV beds is one of the most significant determinants for sustaining waterfowl populations in the Bay. They provide highly nutritious forage for these birds, as well as for many other waterbirds. Nutrients entering the Chester River from farm fields, septic systems, and other sources stimulate algae growth, which blocks sunlight required by SAV for photosynthesis. Subsequent plant decay consumes the water's dissolved oxygen—a process that can result in "dead zones" where oxygen-dependent organisms can no longer survive. Map 3.1, which shows the Virginia Institute of Marine Science's (VIMS) results from mid-July surveys of the SAV present in the Chester River at Eastern Neck Refuge sites, indicates that SAV beds at the refuge that were depleted in 1999 had begun to recover by 2005. The higher the density class, the more productive the habitat is and the higher its wildlife resource value.



Map 3.1. Field Observations of SAV from surveys of the Chester River at Eastern Neck Refuge in 1999 and 2005 (VIMS, 1999, 2005).



Wetlands Habitat

498,000 acres of emergent wetlands surround the Bay. These wetlands are kept saturated by runoff, groundwater seepage, adjacent stream flow, and tides; these habitats range from shrub swamps and cattail marshes along secluded streams to the open salt marshes of the lower Bay. In addition to trapping sediments, recycling nutrients, and providing numerous other hydrologic and energetic benefits, these wetlands are some of the most productive plant communities in the world. Overall wetland acreage has remained relatively stable in the Bay watershed in the past 25 years, averaging about 2.9 million acres since 1982 (CBP 2007b).

Evaluating the refuge wetlands

Jonathan Priday/USFWS

Brackish Marsh Habitat
More than 45 major rivers flow directly into the Bay. Each river has a salinity gradient that can vary greatly along its length. The marsh habitats associated with these estuarine rivers and tidal creeks, are important breeding and nursery grounds for fish and many bird species.

Most of the refuge's 858.8 acres of marsh habitat is considered brackish marsh. Brackish waters are broadly defined as the middle range of the salinity gradient between tidal fresh water and marine (between 0.5–30.0 parts per thousand). The brackish salinity gradient is further divided into three zones: oligohaline zone (low or slightly brackish—0.5–5 ppt), mesohaline zone (moderately brackish—5–18 ppt), and polyhaline zone (highly brackish—18–30 ppt). Much of the Bay falls into this range and during autumn the entire Chesapeake Bay, including some of its shorter tributaries, may be brackish.

Brackish marsh indicator species include narrow-leaved cattail, Olney three-square, switchgrass and common reed, along with associated species such as hibiscus, tidemarsh water hemp, and saltbushes. Additional plant communities include big cordgrass and black needlerush. These plants must be able to survive a wide range of salinities. For example, the most characteristic brackish-wetland species, Olney three-square, can grow in waters from 1 to 18 parts per thousand. These marshes are home to muskrats and other wetland mammals.

The middle of the Bay is dominated by brackish marshes. In these moderately brackish waters, there is the transition from the taller plants of the freshwater marshes to the low-lying salt meadows of the lower Bay. Most of these brackish wetlands are three-square meadows, with taller big cordgrass or narrow-leaved cattail along the margins of tidal creeks and ponds.

These marshes differ from brackish river marshes in having a broad, ill-defined drainage system. Slight changes in the marsh topography and waterfowl, or muskrat "eatouts" may foster shallow tidal pools, or marsh ponds. These ponds are important habitat for migratory waterfowl because SAV, particularly pondweed, grows here. Brackish bay marshes dominate areas inundated by slightly brackish (oligohaline) to moderately brackish (mesohaline) waters. The most important plant indicators include Olney three-square which grows in peaty soils with saltmarsh bulrush, hightide bush, dwarf spikerush, black needlerush in the sandier soils, switchgrass, big cordgrass, and common reed.

Salt Marsh Habitat
No salt marsh occurs on the refuge, but it is a hugely important habitat type for the Bay. A salt marsh may be defined quite simply as "Spartina- and Juncus-dominated wetland." Typically, only three species predominate: saltmarsh cordgrass (*Spartina alterniflora*), saltmeadow cordgrass (*Spartina patens*), and black needlerush (*Juncus roemerianus*). Saltmarsh cordgrass grows in tall colonies along tidal creeks below mean high tide and in shorter stands at or above mean high tide. The tall form characterizes what is often referred to as the "regularly flooded salt marsh," or low marsh, while the short form of cordgrass (growing behind this zone) intergrades with the salt meadows of the irregularly flooded salt marsh, or high marsh. Saltmeadow cordgrass grows in large meadows in the high marsh where the soil is well drained; in wetter (lower) areas of the high meadow, saltgrass (*Distichlis spicata*) may persist.

The waters that flood these wetlands typically have salinities in the upper mesohaline range (10 to 18 ppt) and above. In this range, black needlerush and saltmarsh bulrush (*Scirpus robustus*) can still survive and compete with

Spartina. The transition to pure cordgrass meadows takes place at a point farther north on the Eastern Shore than the western shore due partly to the Coriolis force. These salt marshes are among the most productive plant communities on earth, producing a range of 4 to 10 tons of organic matter per acre per year.

Regional Socioeconomic Setting

Regional Overview

Estuaries are among the most productive environments on earth, creating organic matter and providing habitats that support a diverse community of plants and animals. The Bay is the largest of the 130 estuaries in the U.S. and, as noted above, is extremely rich in species and habitat diversity. These attributes contribute to its high human value and affect the surrounding human environment both socially and economically. Most of the present population of the Bay watershed, about 16.6 million people, affects the Bay and is affected by it. Populations are densest and clustered in the urban and suburban centers of Washington, D.C. and Baltimore. Many live along the Bay's shores in hundreds of small cities, towns, and villages that arose because of the presence of the Bay. The quality of life of the residents of these smaller communities is inextricably tied to the Bay and its rivers (Lippson and Lippson 1984).

The area of tidal influence connecting Maryland, Virginia, and Washington D.C. is collectively referred to as the "Tidewater" area. This Tidewater area encompasses the Chesapeake Bay. Of Maryland's 23 counties, only 7 are unaffected by tidal influence. In Tidewater Maryland, the counties are almost entirely water-bounded. These peninsulas are often locally called "necks," such as Eastern Neck. Kent County, where the refuge is located, has 209 miles of waterfront. The abundance of water in the area has had a strong influence on the socioeconomic characteristics of the region.

Bay Environmental Challenges

There are many environmental challenges in the Bay region. Many human-induced changes have had profound effects on the Bay and its tributaries. The cities of Baltimore and Washington, both at the Bay's headwaters, produce many tons of wastes, silts, and chemicals, which ultimately flow into the Bay. The Bay's location near several major cities also makes it an important shipping channel. Current levels of rapid human growth demand additional space for development. By 2020, scientists project the watershed population will grow an additional 2.5 million to a total of 18 million. The various uses of the Bay are beginning to conflict. Entire species of fish and shellfish are no longer commercially viable. Some, like oysters, remain, but at a mere one percent of their former abundance. Major environmental challenges in the Bay region include urbanization, habitat loss, excess nutrients, sediments, toxic chemical contaminants, and air pollution (NRCS 2006).

Local and regional governmental and grassroots groups, recognizing the Bay's environmental problems, have organized to reduce the amount of pollution that enters the Bay and improve water quality. Perhaps the most prominent of these groups is the Chesapeake Bay Program (CBP), a regional partnership of local, state, and Federal agencies along with non-governmental organizations that has directed the restoration of the Bay since 1983.

Impressively, the Bay has the highest land to water ratio of any estuary in the U.S.—thus, land-based activities heavily and directly influence the condition of the Bay (NRCS 2006). About 25 percent of the Bay watershed is in crop and pasture uses. Non-federal forest land accounts for 47 percent, while developed

land has risen to 12 percent. Conversion of land from agricultural to other uses creates a complex interaction among resource concerns, including increased runoff. Urban and suburban areas deliver the highest pollutant loads on a per acre basis and occupy over 5 million acres of the watershed. Agriculture is identified as another top contributor of non-point source pollutants because it occupies such a large share of the non-forested portion of the watershed, approximately 10 million acres (NRCS 2006).

An estimated 23,000 confined livestock and poultry operations are within the Bay watershed. The combination of livestock concentration and soil and land use factors in certain areas make manure management a priority to prevent potential water quality problems. Nutrient loading could cause impairment to the SAV beds and shallow water habitats so valuable to many species of fish and wildlife. The CBP has set a goal to establish nutrient management plans on 4.5 million acres of cropland to support achievement of the nutrient reduction goal. According to data collected from participating state and Federal agencies, 3.42 million acres of cropland and hay land in the Bay watershed were placed under nutrient management plans between 1985 and 2003 (NRCS 2006).

The CBP also has a goal to re-establish or establish 25,000 acres of wetland by 2010. To date, 40 percent of this goal has been achieved (NRCS 2006). The Service has actively participated in this restoration.

Land Use

Maryland's Upper Eastern Shore—comprised of Kent, Caroline, Queen Anne's, and Talbot counties—covers more than 1,200 square miles of scenic farmland, coastline, forests, and colonial towns. All four counties possess a rich potential for heritage and nature tourism, and are connected by a rural corridor that includes the newly designated Chesapeake Country National Scenic Byway which leads to Eastern Neck Refuge. The refuge serves as a land use model within the Bay watershed through its sustainable agriculture, native natural landscapes, and renewable energy.

Land use on the Upper Eastern Shore is dominated by agriculture and forest. In all counties, developed urban land accounts for less than five percent of total land use. Of all Maryland counties, Caroline County has the greatest change in land use due to development pressure. More than six percent of its agricultural and forest land has been converted to residential or urban use since 1973.

Some of the most productive land in the Bay region has already been lost. The U.S. EPA estimates that the state of Maryland has lost over 70 percent of its wetlands since European settlement (EPA 2009). Additionally, 50 percent of forests have also been lost (MDNR 2005). Currently, open space is being lost on an average of 90,000 acres annually (USFWS 2006a).

The social environment in the Bay is changing alongside the physical environment. In the past 50 years, the human population in the watershed has doubled to its current level of nearly 16.8 million individuals (CBP 2009b). Increased population demands additional development and urbanization, leading to habitat and open space loss and fragmentation. Human attitudes are also changing with changing demographics and a loss of ties to the land due to increased urbanization. The economy is slowly shifting away from land and water-based professions such as agriculture, forestry and fishing. These professions are being replaced with service, industry, retail and tourism jobs (KCDPZ 2006). Places for relaxation and recreation are increasingly in demand, and many people want to live on or near the water.

Maryland's remaining marshes, including those on the refuge, have become increasingly valuable as a public resource because the distribution and functional health of this habitat has been drastically reduced. Loss of critical wetlands not only affects the health of the Bay ecosystem, but also impacts state and local economies. The natural resources of the Bay significantly contribute to the economic well-being of Maryland, and also enhance the quality of life of Maryland's citizenry. Maryland's marshes are used for multiple purposes, including fishing, hunting, trapping, bird watching, and observing and photographing wildlife.

These marshes also serve as important spawning or nursery sites for many finfish and shellfish. The Bay provides more than $60 million annually in commercial finfish and shellfish catches. Major tributaries of the Bay account for about 90 percent of the striped bass spawned on the East Coast (Berggren and Lieberman 1978). In 1995, the catch of blue crab, Maryland's most abundant and valuable shellfish, was 40.3 million pounds valued at $29 million (Holiday and O'Bannon 1997). In addition, $275 million was spent directly on recreational fishing with a total economic impact to Maryland of $524 million. More than 4,500 jobs and $31 million in state and Federal tax revenues are directly related to hunting and non-consumptive activities associated with migratory waterfowl and bird use in Maryland (Southwick Associates 1995). Waterfowl hunting boosted Maryland's economy by $15.6 million in 2001 (USFWS 2005) while a statewide 2006 survey (USFWS 2007c) showed that Maryland expenditures for recreational fishing were $547 million, for hunting $200 million, and for wildlife watching $596 million.

Kent County Demographics—Current and Projected

Current Demographics

Kent County, which includes Eastern Neck Refuge, is a predominantly rural area that is home to about 19,197 residents (USCB 2006). The County is bordered by Cecil County to the north, Queen Anne's County to the south, the State of Delaware to the east and the Bay to the west. Founded in 1642, Kent County is the second oldest county in Maryland (KCDPZ 2006) and currently has a total area of 414 square miles—279 square miles of land and 135 square miles of water—or 179,480 acres. Land cover in the County varies from historic waterfront towns to stretches of rolling farmlands and tidewater tributaries of the Chesapeake River.

Farming has been a way of life on Maryland's Upper Eastern Shore for nearly four centuries, and maintaining open spaces through traditional agricultural uses and conservation reserves is a local legacy. Though development is occurring throughout the area, much of Kent County remains open and is comprised of 65 percent forest, wetland, and agricultural land. Only seven percent of County land is developed (KCDPZ 2006).

In recent years, the economy of Kent County has grown from chiefly farm-based and water-related to include industry, retail, tourism, and other service-oriented businesses. In 2004, Kent County had the fifth largest increase in jobs in the state (KCDPZ 2006). The County covers five incorporated towns: Betterton, Galena, Chestertown, Millington, and Rock Hall. Each town has its own independent planning and zoning boards, plans, and ordinances.

Organizing for a refuge project

Jonathan Priday/USFWS

Projected Regional Growth
The Eastern Shore is currently experiencing an unprecedented level of change. Historic growth rates and patterns are being drastically changed by rapid suburban development. Although Kent County currently has the lowest population of any county in Maryland, the County population grew by eight percent between 1990 and 2000. Between 1973 and 2002, the amount of developed land increased by almost 135 percent according to the Maryland Department of Planning's Land Use/Land Cover data (2000). The County is determined to preserve the present quality of life by planning for a manageable rate of growth that does not exceed its historic growth rate. The County intends to allow only limited growth in specific locations in a manner that complements and enhances the character of each community (KCDPZ 2006).

Recreation and Tourism
Regional parks and conservation lands of the Upper Eastern Shore are illustrated in Map 3.2 Kent County has an extensive park system with eight county parks (managed by the Kent County Parks and Recreation Department), and two State parks (KCPR 2009). The refuge is the only protected federal land. Of the numerous county parks, only Cann Demonstration Woodlot and Turners Creek Park provide the types of natural environments and wildlife–related opportunities also available at the refuge. Two state management areas also provide nearby wildlife-related recreational opportunities.

Map 3.2. Regional Parks and Conservation Lands

Eastern Neck Refuge Environment

Location and Size of Refuge

As mentioned previously, Eastern Neck Refuge is one of four refuges that make up the CM Refuge Complex, which also includes Blackwater and its divisions, Susquehanna, and Martin refuges (see chapter 1, map 1.1). Located within a short drive of several major metropolitan areas, this 2,286 acre island-refuge is one of the most popular nature tourism destinations on Maryland's Upper Eastern Shore. At the mouth of the Chester River, it is separated from the mainland to the north by a 620-ft wide shallow channel between the river and the Bay. The island is accessed via Route 445—Eastern Neck Island Road—which ends on the refuge.

Land Cover and Soils

The existing refuge landscape, depicted on map 3.3, features a high degree of habitat interspersion and diversity, ranging from croplands and woodlots to brackish tidal marsh and freshwater ponds. Chapter 4, table 4.1, compares existing land cover acreage with those that will result under full implementation of this CCP. Map 4.1 provides a graphic representation of the land cover we expect will result after approximately 15 years of CCP implementation. Moderate to poorly drained, silty soils of the Mattapex-Othello association are found throughout the island. Refuge land is relatively flat with a range in elevation from zero to 20 feet above sea level. The refuge has approximately 15 miles of shoreline.

Refuge Management Facilities

Refuge Offices and Visitor Facility

The refuge office and visitor facility is currently located on refuge lands in a former hunting lodge that was originally built in 1933. This building is eligible for the National Register of Historic Places. The lodge was renovated in 2005 to national historic preservation standards and to allow for year round occupancy by refuge staff. The building is used not only as the refuge office, primary visitor contact facility and Friends bookstore, but also for meetings, seminars, and training sessions.

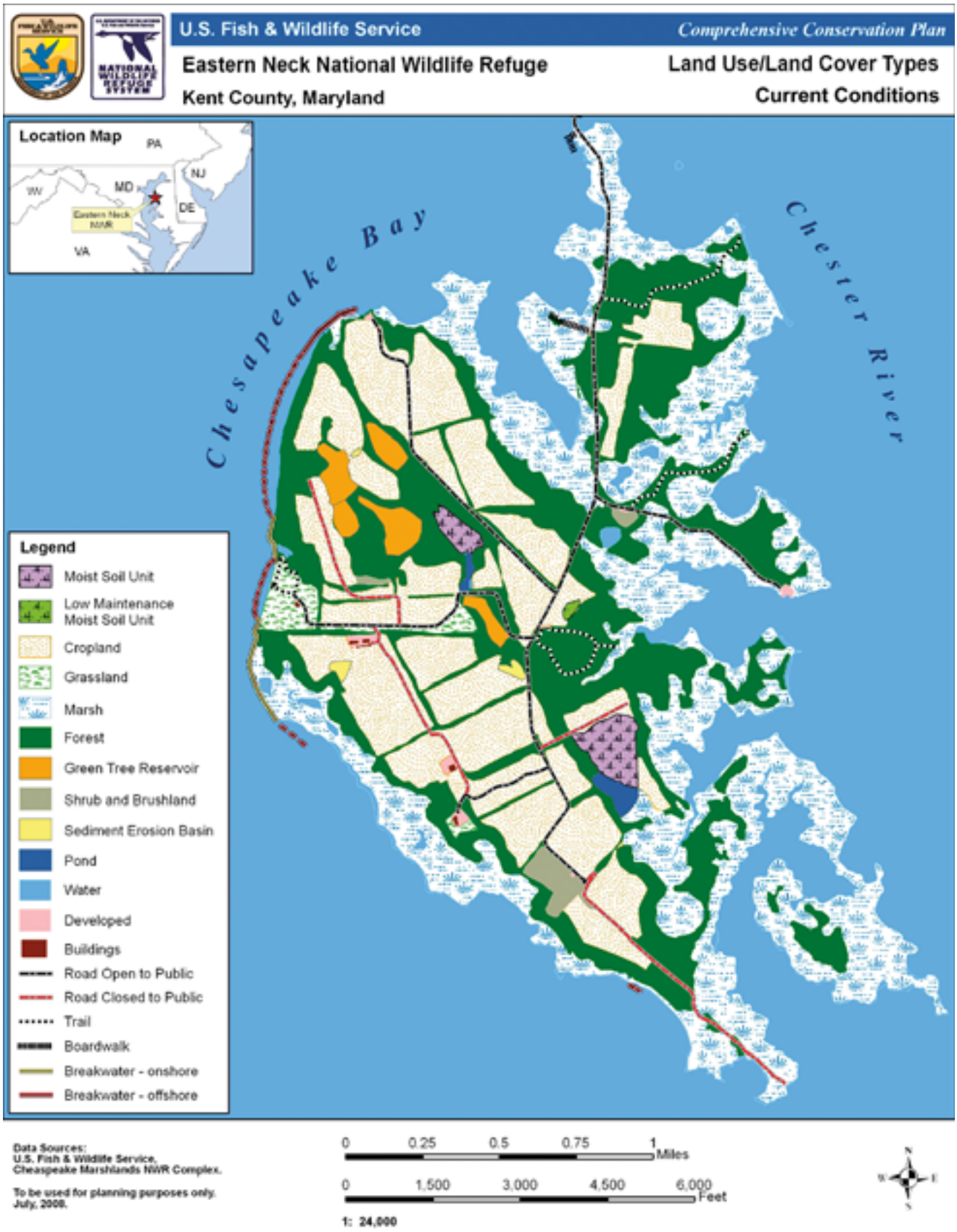
Cape Chester House Quarters and Staff Residence

There are two houses on the refuge. One is the former refuge headquarters and is referred to as the "Cape Chester House." This facility is now used by seasonal staff, volunteers and researchers. The second home was originally built in 1934 for the caretaker of the hunting club property. It is now used as a year round private residence by refuge staff. Both houses are regularly maintained for occupancy.

Alternative Energy Facilities

A 60-foot-tall wind turbine was installed and commissioned in 2002 at the Cape Chester House; one of the first on a refuge in the Region. Over the course of its first three years in place, an extensive monitoring program was initiated to detect any avian interactions with the wind turbine. Components of the monitoring program include pre-construction site surveys to determine avian species of concern, and the development and implementation of a protocol to ensure that any avian-tower interactions are detected and documented. During the three year study, 17 bird carcasses were found in the search area. Fifteen of the 17 carcasses could be attributed to the wind turbine, and 14 out of those 15 were invasive European starlings. The other three were a catbird, a bank swallow, and an unidentifiable bird. Unfortunately, the wind turbine has not operated as efficiently as originally hoped and annual maintenance has proved expensive. However, we believe that maintaining the turbine at the Cape Chester House provides a source of backup power to the facility during the Island's frequent power outages. The turbine also provides the refuge with a high-visibility opportunity to demonstrate that the Service is committed to alternative energy sources and to reducing its carbon footprint.

Map 3.3. Existing Land Use and Land Cover Types on Eastern Neck Refuge



Two sets of solar panels, with a capacity of 2.5 kilowatts (kW) each, were installed in 2004 at the Cape Chester House. These have been functioning well. However, given that there is only seasonal occupancy of the Cape Chester House, we are currently running an annual electrical surplus. Given Maryland's net metering laws, we are currently unable to use this surplus to offset electric usage at other locations/meters on the refuge. Therefore, this surplus is being sent back to the electric utility to be sold on the open market. Hence, we are considering ways to shift electric usage from other buildings on the refuge to the Cape Chester House. We are also considering whether to replace the House's current oil furnace with a high efficiency heat pump (powered by electricity). An electric heat pump would be more efficient, reduce the refuge's carbon footprint and utilize our entire electrical surplus.

Public Recreation Facilities

The refuge's facilities support a wide variety of wildlife-dependent recreation opportunities. These include: two boardwalks, six walking trails with interpretive panels, four observation blinds, and a water trail for canoeing and kayaking to facilitate wildlife observation, wildlife photography, and self-guided interpretation. These facilities and visitor program opportunities are described in more detail below under the section "Visitors Services."

Refuge Revenue Sharing Payments

Since the Federal government does not pay property taxes, a refuge revenue sharing program was established under the Refuge Revenue Sharing Act (16 U.S.C. 715s) to reimburse local taxing authorities and help defray the loss of those taxes. The Service makes refuge revenue sharing payments to Kent County based on the total acreage and the appraised value of refuge lands. These annual payments are calculated by formula determined by, and with funds appropriated by, Congress.

Table 3.2 provides a multi-year comparison of the refuge's compensation to its community.

Table 3.2. Revenue Sharing Payments to Kent County, MD

Fiscal Year	Payment
2002	$31,638
2003	$30,408
2004	$26,896
2005	$33,376
2006	$28,114
2007	$28,434
2008	$28,434

Refuge Step-Down Management Plans

The refuge is currently operating under the step-down plans listed below. All are available for review by contacting refuge headquarters. Chapter 4 outlines scheduled plan updates or new plans to be initiated.

- Croplands Management Plan (1981; reviewed annually)
- Deer Hunt Plan (1985; reviewed annually)
- Public Use Management Plan (1993)
- Fire Management Plan for the Refuge (1994)
- Chronic Wasting Disease Plan for the Refuge Complex (2007)
- Avian Influenza Plan for the Refuge Complex (2007)
- Integrated Pest Management Plan for the Refuge Complex (2009)

- Turkey Hunt Plan (reviewed annually)

Special Use Permits

Over the last five years, we have issued the following special use permits.

- Baltimore City Community College—Collection of insect specimens
- Maryland Wood Duck Initiative—Installation and monitoring of wood duck boxes
- Kent County Bird Club—Various meetings and/or field trips/ annually
- Individual—Survey and collection of moths
- U.S. Geological Survey—Diamondback terrapin research study
- New Millennium Development—Remove common reed (*Phragmites australis*) to use in the green building industry
- Individual—To collect fecal samples of geese and waterfowl to determine if they carry a the intestinal parasite Cryptosporidium which may impact water quality in the Bay
- Boy Scout Troop 200—Overnight camping and shoreline clean up at Ingleside
- Patuxent Wildlife Research Center, U.S. Geological Survey—Establish and regularly monitor wetland stability stations on the refuge from July 2005—July 2010
- Individuals—Removal of downed wood for personal use firewood

Eastern Neck Refuge Partners

We have established many partnerships over the years with a variety of organizations to accomplish refuge programs and objectives. These relationships are integral to managing, monitoring, and evaluating the projects and programs we undertake:

- American Legion of Rock Hall
- Chesapeake Alliance
- Chesapeake Paddlers Association
- Chester River Association River Keepers
- Easton Waterfowl Festival
- Friends of Eastern Neck
- Maryland Department of Natural Resources
- Maryland Department of the Environment
- Maryland Energy Administration
- National Aquarium in Baltimore
- National Renewable Energy Laboratory
- National Wild Turkey Federation
- Kent County Bird Club
- Kent County Dept. of Parks and Recreation
- U. S. Army Corps of Engineers
- Kent County Dept. of Tourism
- Kent County Roads Dept.
- Ducks Unlimited
- University of Maryland
- University of Delaware
- U. S. Geological Survey

Friends of Eastern Neck

The Friends of Eastern Neck, Inc. (FOEN) was established in 1997 as a cooperative association to support our public outreach and wildlife management programs. In 1999, the FOEN took charge of a bookstore on the refuge. FOEN also hires a hunt coordinator for the deer hunt program. Co-located in the refuge visitor contact station, the bookstore produces supplemental funding for public use activities and facilities. FOEN is a 501 (3)(c) organization, which makes their funds particularly valuable when leveraged as matches to grant proposals for various projects throughout the refuge.

Volunteer Program

Volunteers are essential participants in every aspect of our management. Our biological, maintenance, and visitor service's programs are enhanced each year by volunteer projects. We discuss some of the volunteer-led visitor activities further under the 'Visitor Services and Programs' section. In 2007, 160 citizens conducted volunteer work on the refuge, donating over 9,000 hours to improving wildlife habitat, maintaining facilities, environmental education, supporting other recreational programs, protecting or cataloging cultural resources, and making other improvements of the refuge. Our volunteers have taken the lead on the following annual events and programs which have been on-going for years. We simply could not offer these programs, or participate in these community events, without volunteer assistance:

- Rock Hall Business Expo in February
- Owl Prowl in March
- Earth Day bird walk in April
- Earth Day shoreline clean up in April
- International Migratory Bird Day in May
- Waterfowl Watch in December
- Chestertown Tea Party in May
- Youth Fishing Derby in June
- Rock Hall Fall Fest in September
- Chestertown Wildlife Festival in October
- The Big Sit in October

Refuge Wetlands Habitat

The refuge encompasses approximately 859 acres of tidal marsh adjacent to the refuge shoreline. Other wetlands described below include green tree reservoirs, moist soil units, and refuge ponds.

Tidal Marsh
Tidal brackish marshes are transitional wetlands between tidal freshwater systems and salt marshes. They are the most extensive wetland type in Maryland occurring along the many miles of rivers and shores where the salinity of water ranges from 0.5-18 ppt. Plant species diversity in brackish

USFWS

Eastern Neck refuge tidal wetlands

marshes is low and dominated by graminoids (grasses and grass-like plants) that often form extensive dense patches (MDNR 2005). Vegetation growing in the refuge's tidal marsh includes Olney three-square (*Scirpus olneyi*), narrow-leaved cattail (*Typhus augustifolia*), and saltmarsh cordgrass (*Spartina alterniflora*). Saltmarsh cordgrass, which dominates the marsh, is the most important species of marsh plant in the Bay estuary. The plant composition of the refuge tidal marsh as classified according to the National Vegetation Classification System is shown in Table 3.3.

Table 3.3. National Vegetation Classification of Eastern Neck Refuge Tidal Marsh

National Vegetation Classification System – Associations in the Tidal Marsh	NVCS Code	Acres
Baccharis halimifolia - Iva frutescens / Spartina patens (e.g. Shrubland)	3921	28.5
Juncus roemerianus (e.g. Herbaceous Vegetation)	4186	0.6
Phragmites australis (e.g. Tidal Herbaceous Vegetation)	4187	270.1
Spartina alterniflora / (Ascophyllum nodosum) (e.g. Acadian/Virginian Zone Herbaceous Vegetation)	4192	56.7
Spartina cynosuroides (e.g. Herbaceous Vegetation)	4195	1.8
Spartina patens - Distichlis spicata - Juncus roemerianus (e.g. Herbaceous Vegetation)	4197	67.9
Typha angustifolia - Hibiscus moscheutos (e.g. Herbaceous Vegetation)	4201	30.9
Morella cerifera - Rosa palustris / Thelypteris palustris var. pubescens (e.g. Shrubland)	4656	5.7
Schoenoplectus americanus - Spartina patens (e.g. Herbaceous Vegetation)	6612	214.2

Green Tree Reservoirs

Green tree reservoirs (GTRs) are forested lowlands that are temporarily flooded during the fall and winter to attract waterfowl. Flooding occurs when trees are dormant, but when waterfowl are still present in high numbers and can forage on the acorns, seeds, and macro-invertebrates. Water control structures in GTR areas allow water levels to be manipulated.

The refuge currently maintains five GTRs which were constructed in 1979 to flood the bottomland hardwood forest and provide resting and feeding habitat for migrating and wintering waterfowl such as wood ducks, mallard ducks, black ducks, and teal. At full pool level, these GTRs provide approximately 38 acres of habitat within the Durdin Creek drainage which flows from west to east into the Chester River. The GTRs flood with natural precipitation in the winter when trees are dormant, and drained in the spring before leaves grow back to prevent stressing and/or drowning the trees. The annual flooding schedule varies from year to year to more closely emulate natural water regimes; not all impoundments are flooded each year.

GTR#2 has a stop-log water control structure while the other four GTRs have screw-gate water control structures for water level management. All the water control structures need to be evaluated, and possibly replaced, in order for the GTRs to function most efficiently. A deep well with a turbine pump provides the capability to flood all GTRs except GTR#4. Water level manipulations for each GTR are incorporated into an annual Habitat Management Plan. Table 3.4 describes the green tree reserves units at the refuge.

Table 3.4. Green Tree Reservoir Characteristics on Eastern Neck Refuge

Unit	Waterfowl Usage*	Acres	Water Control Structure Type	Dominant Tree Species**
GTR#l	BL, ML, WD, GT	5.5	Screwgate	RM, SG, BG, SC
GTR#2	BL, ML, WD	9.6	Stop-log	RM, SG, RO
GTR#3	BL, ML, WD	11.6	Screwgate	RM, SG, BG, RO
GTR#4	BL, ML, WD	4.7	Screwgate	RM, SG, BG, RO, WO
GTR#5	BL, ML, WD	6.6	Screwgate	RM, SG, BG, SC, RO, WO

**Waterfowl species:*

BL - Black ducks
ML - Mallards
WD - Wood ducks
GT - Green-winged teal

***Tree species:*

RM - red maple *(Acer rubrum)*
SG - sweet gum *(Liquidambar styracflua)*
BG - black gum *(Nyssa sylvatica)*
SC - swamp chestnut oak *(Quercus michauxii)*
RO - southern red oak *(Quercus falcata)*
WO - willow oak *(Quercus phellos)*

Moist Soil Units

MSUs are low-lying, naturally wet non-forested areas, where water is impounded seasonally. On the refuge, late summer precipitation is held by earthen berms to create flooded areas, primarily to benefit fall migratory and wintering waterfowl, and to a lesser extent shorebirds and wading birds. Decomposing vegetation and invertebrates provide a rich foraging area.

The refuge currently has three moist soil units (MSUs), comprising 29.7 acres (map 3.2), which provide feeding habitat for wintering and migratory waterfowl species such as AP Canada geese, black ducks, mallards, teal, and pintails.

The Headquarters Pond Moist Soil Unit is approximately 10 acres, which includes a small pond on the lower portion of the unit. A drainage ditch runs from the pond to the MSU for efficient water level management. Water levels are manipulated using a stop-log type water control structure which is situated between the pond and a GTR. Winter (full pool) gauge readings range at approximately 4' to 5' depending on rainfall, while summer drawdown readings are maintained at 3' or below. The water gauge is located in the pond, and water levels are much lower in the MSU providing suitable habitat for migrating waterfowl in the fall and winter, and substrate for wetland plant species throughout the spring and summer. This impoundment is dominated by smartweed, millet and various sedges.

Shipyard Creek Moist Soil Unit is located northwest of Shipyard Creek, and constructed in 2007 by Ducks Unlimited. This entire moist soil unit is approximately 18.4 acres, with the flooding potential of approximately 6.8 acres. The stop-log water control structure is located on the southeast portion of the impoundment, and is dependent on rainfall and water that overflows from Cedar Point Pond. This impoundment was not completed in time for the fall waterfowl migration, therefore vegetation and waterfowl use data is unavailable.

Wildlife Trail Moist Soil Unit is approximately 1.3 acres, and located near the Wildlife Trail. It is surrounded by an agricultural field which is planted in corn, wheat and clover over a rotation. The stop-log water control structure is located in a very low dike on the southeastern portion of the impoundment. This

structure remains closed throughout the year, allowing water to collect naturally from autumn precipitation and dissipate through soil percolation, transpiration, and evaporation throughout the rest of the year. It is dominated by smartweed, sedges and various grasses.

Refuge Ponds

The Headquarters Pond is approximately 8 acres. This pond was formed prior to refuge establishment when the road into the former refuge headquarters area was constructed to access the planned Cape Chester housing development over thirty years ago. A portion of the road forms the pond dike, which contains a stop-log type water control structure. This structure allows for water level manipulation of the MSU and GTR.

The Cedar Point Pond is approximately 0.3 acres and was built before the refuge was established. We have no records on its creation, but assume it was created and used by the Cedar Point Hunt Club.

Refuge Upland Habitats

Forest

The refuge contains 708 acres of forested habitat, comprised primarily of loblolly pine, hardwoods, and mature oak-sweetgum forest. Forested acres occur in relatively small woodlots scattered throughout the refuge and are interconnected by hedgerows consisting primarily of black cherry and locust. The pine areas are successional forest, and the understory is comprised of holly, green briar and poison ivy. The hardwood areas contain mixtures of maple, paw-paw, spicebush, and various ferns in the understory and shrub layers. Some of the oak-sweetgum associations are slowly succeeding to the climax oak-hickory communities.

Forest stands range from one to more than 100 years old, and function as buffer zones and corridors utilized by a variety of species. Forested habitat also provides nesting trees and roosting areas for the bald eagle, two high priority PIF species—wood thrush and eastern wood pewee—and six other moderate- or low-priority PIF species.

The U.S. Forest Service conducts regular surveillance of the refuge and, as of 2003, found the refuge's forests to be in good health, with no imminent outbreaks expected of gypsy moths, pine beetles, or other pests or pathogens.

Grassland

The refuge maintains approximately 30 acres of grassland. The largest single grass field is approximately 22 acres and extends east from the refuge's western shoreline near the Cape Chester House and former headquarters. This field benefits migratory Monarch and other butterflies, migratory birds, foraging raptors, and is a popular viewing area and destination for refuge visitors. Field communities are dominated by low cudweed, fleabane, smartweed, and crabgrass. The refuge's grasslands also support a variety of wildflower species. The grassland is managed using a combination of mowing and prescribed burning.

Managed Cropland

The refuge currently contains approximately 557 acres of cropland although it is not all managed in any given year. Managed croplands provide a valuable food source for wintering AP Canada geese and other waterfowl. The refuge's farming program also showcases sustainable farming techniques that prevent sediment, chemical, and nutrient runoff from agricultural fields into the Bay and its tributaries. Best-management farming practices include crop rotation, cover crops, no-till planting, utilization of grass waterways and field borders, and the

Managed croplands on the refuge

Jonathan Priday/USFWS

use of nitrogen-fixing, weed-controlling crops to reduce the need for chemical fertilizers and herbicides. Crop rotation enables the refuge to use 40 to 50 pounds less fertilizer per acre than standard farming practices. The refuge does not use insecticide, unless absolutely necessary, and only those that are approved for use on the refuge by the Regional Contaminants Coordinator. Refuge sediment erosion basins assist in management of cropland by retaining runoff from cropland areas. The croplands are managed through a cooperative agreement with a local farmer. The present agreement allows the farmer to harvest 80 percent of the crop each year, while leaving 20 percent of the crop in the field for wildlife.

In the 1970s, the refuge farmed over 1,000 acres of cropland primarily to benefit migrating and wintering waterfowl. Farming practices were discontinued from 1974 to 1982 because of concerns that area-wide farming practices were leaving a large amount of grain in the fields and disrupting the movement of migrating waterfowl. The concern was these croplands were keeping waterfowl farther north than they have stayed historically, thereby exposing them to harsher winter conditions and reducing over-winter survival. The refuge's cropland management program was reinstituted on fewer acres in the 1980s after a determination that the mid-Atlantic farming on refuges was not disrupting waterfowl distribution further south along the Atlantic Flyway. As farming once again became an important refuge program for waterfowl, we also incorporated the objective to provide habitat for the endangered DFS. In 1981, fenced food plots were established to benefit the endangered DFS population, who typically feed on crops left along hedgerows; however, the recovery team also a recommended ratio of 2:1 forest to crops, which was deemed to be an ideal mix of habitat types for DFS.

Crops currently grown on the refuge include corn, soybeans, and clover. Map 3.4 depicts the location and type of crops grown in 2007 on the refuge. In addition, winter wheat is often planted as a cover crop after harvesting corn or soybeans. Table 3.6 provides a summary of crops planted on the refuge from 2004-2007.

Map 3.4. Cropland Fields Map for Eastern Neck Refuge during 2007

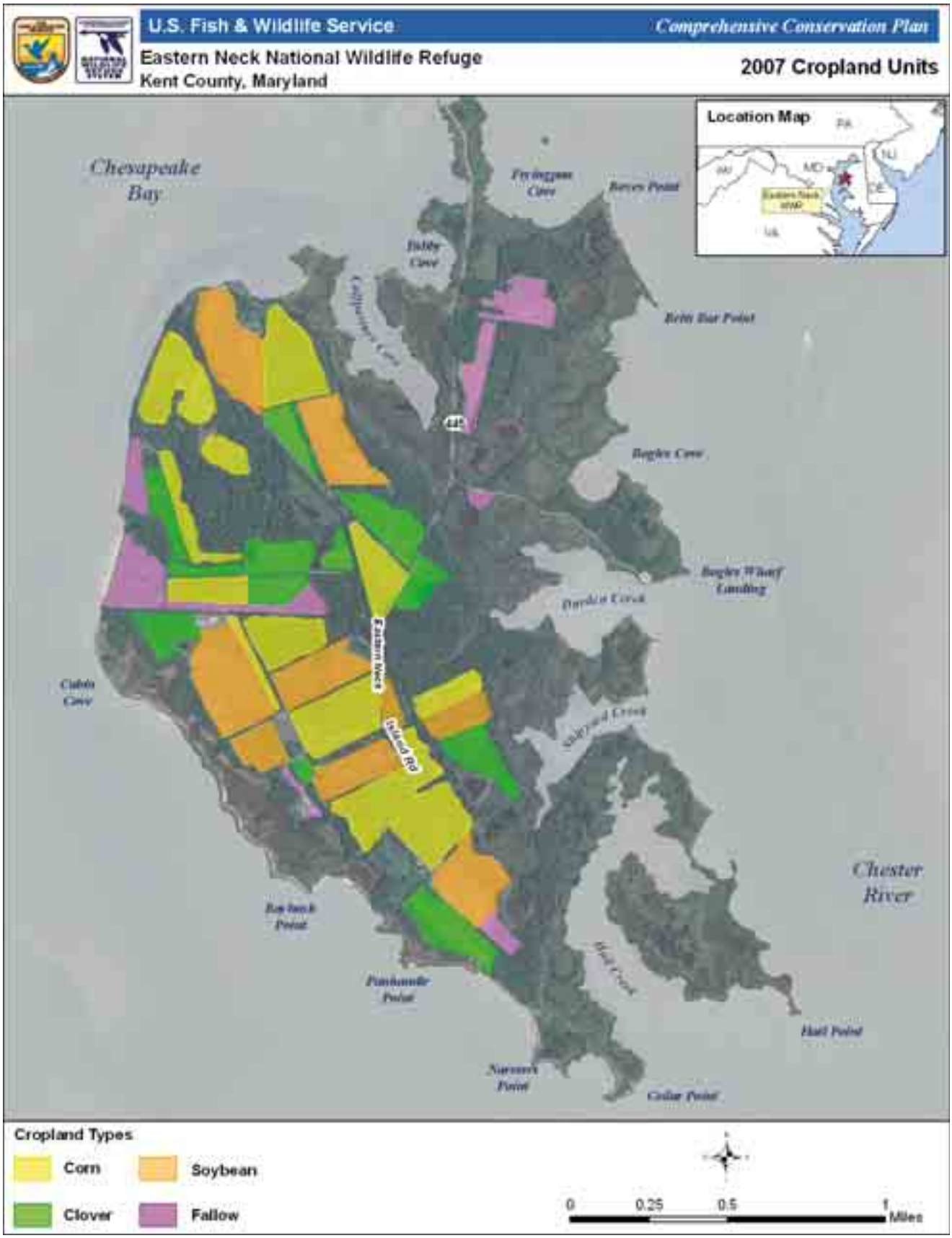


Table 3.5. Cropland management on Eastern Neck Refuge from 2004-2007

Crop*	2004	2005	2006	2007
Corn	169.2	182.5	177.1	210.3
Soybeans	179.5	186.4	207	189.3
Clover	70.6	70.7	46.9	37.5
Wildlife food plot	64.1	66.7	75.9	64.1
Sunflowers	8.1	7.5	--	--
Total	491.5	513.8	506.9	501.2

**Winter wheat is sometimes used as a cover crop on these same units*

Special Management Areas

The Service administratively designates research natural areas (RNAs) and Public Use Natural Areas (PUNAs) on refuges. RNAs are part of a national network of reserved areas under various federal land ownerships. Other federal land management agencies also have designated RNAs. They are intended to represent the full array of North American ecosystems with their biological communities, habitats, natural phenomena, and geological and hydrological formations. PUNAs are a separate designation used only by the Service and the Refuge System. The network of PUNAs across the country were established to assure the preservation of a variety of significant natural areas for public use with certain restrictions and which, when considered together, illustrate the diversity of the Refuge System natural environments, and preserve these environments as essentially unmodified by human activity for future use.

The refuge features the Hail Point RNA (see map 1.4). In 1975, the Service designated the 149-acre tidal salt marsh at Hail Point as a RNA because it was considered a relatively undisturbed, naturally-functioning intact tidal marsh and because it contained an unusual plant association, a 20-acre loblolly pine-American holly forest. In addition, at the time it was designated, there was a 50 nest great blue heron colony and an osprey nest site. At present, there are no intensive research projects being pursued.

This RNA is located in the most isolated portion of the refuge and thereby minimally affected by human factors, except for occasional boaters traveling around the southern end of the refuge. This area of the refuge is experiencing significant erosion from the Chester River-side. The area is also known as a Monarch butterfly staging area where the butterflies can be observed resting in their fall migration before attempting their flight across the Bay.

The Tubby Cove PUNA was established in 1975 (see map 1.4) because it provided a relatively undisturbed natural setting that was accessible to the public, and affords exceptional educational and interpretive opportunities. The established trail allows people to view wildlife and marsh habitat, while minimizing impacts to resources by requiring people to stay on the trail and in the viewing area/platform.

Refuge Fauna

Birds

The refuge provides habitat for over 240 bird species including 143 species listed as of conservation concern by the Service, BCR-30, Partners in Flight, or MD DNR. A complete list of birds of conservation concern found at the refuge is included as Appendix A.

Waterfowl
Each winter, ducks, geese and swans are counted along Maryland's Bay shoreline and Atlantic coast during the Midwinter Waterfowl Survey. The survey is conducted by pilots and biologists from the Service and MD DNR. The list includes a large variety of migratory waterfowl. The lower Chester River Basin is a major staging and wintering area for ducks, geese and tundra swans. The Chester River winters tens of thousands of AP Population Canada geese and many of those use the refuge, which offers sustenance as well as sanctuary.

The 2007 survey was flown between December 27, 2006 and January 4, 2007. A total of 478,900 birds were counted, which was a substantial decrease from the year 2006 count of 577,100. In 2007 tributaries and bays along the Chesapeake were completely ice-free. Since the Maryland Midwinter Waterfowl Survey only covers the tidal, estuarine waters, it is likely that many ducks and geese remained inland on open freshwater reservoirs, lakes and ponds that are normally ice covered.

Low numbers were recorded for several diving ducks in 2007 as well. Most notable was a record low count of canvasbacks (13,800), down from 33,800 in 2006. The previous low count of canvasbacks was from 1988 when only 23,200 were recorded. Scaup (25,700) showed a substantial decrease, down 53,800 from 2006 (79,500). Mergansers (1,700) also decreased markedly from 2006 (7,000). The low number of diving ducks was probably related to the warm winter and ducks remaining north of traditional wintering areas. High counts of canvasbacks, scaup, long-tailed ducks, redheads, and mergansers were recorded during the Midwinter Waterfowl Survey of the Great Lakes where habitats were relatively ice-free January 2007.

In Maryland, mallard numbers were greater during 2007 (39,700) than in 2006 (32,500). The number of black ducks counted in 2007 (13,800) was similar to 2006 (13,300), but the 2007 count was substantially below counts made prior to 2005.

Canada goose numbers (285,700) in 2007 were slightly below the 305,400 counted in 2006. The tundra swan count (8,700) was similar to the record low of 8,200 in 2006. Recent banding studies have shown that tundra swans spend less time in Bay and most now winter further south in North Carolina.

The Maryland Midwinter Survey numbers from 2003–2007 are listed in Table 3.6 below.

Waterfowl populations on the refuge have been regularly surveyed by refuge staff and volunteers since 1996. Survey points include the refuge impoundments, and croplands, as well as adjacent tidal waters of the lower Chester River Basin and the Bay that are visible with binoculars from the refuge. Survey numbers are measured over waterfowl seasons—October through March. Peak waterfowl populations for individual species over four seasons—2003-04 to 2006–07—are listed in table 3.7. Total counts are not displayed in table 3.7 because the table represents the daily peak count for an individual species for the stated year. These daily peaks did not occur on the same day for each species, so therefore, providing a total would not reflect an actual number that occurred on any given survey day. This refuge survey is separate from the State of Maryland midwinter aerial waterfowl survey that covers the entire lower Chester River basin and other parts of the Bay supporting wintering waterfowl.

Table 3.6. Maryland midwinter waterfowl survey counts 2003 to 2007.

Species	2003	2004	2005	2006	2007
Mallard	39,000	48,200	52,800	32,500	39,700
American Black Duck	22,500	31,700	23,600	13,300	13,800
Gadwall	3,700	2,500	1,400	1,200	1,400
Widgeon	800	6,000	2,000	300	400
Green-winged Teal	1,000	1,200	1,000	400	3,300
Northern Shoveler	0	100	100	0	100
Pintail	1,300	4,600	1,900	2,500	500
Total Dabbling Ducks	**68,400**	**94,300**	**82,800**	**50,300**	**59,200**
Redhead	5,100	6,100	9,300	1,800	1,100
Canvasback	40,000	30,800	39,400	33,800	13,700
Scaup Spp.	66,600	106,300	189,800	79,500	25,700
Ring-necked Duck	300	200	1,000	500	900
Common Golden-eye	2,100	1,000	3,000	700	700
Bufflehead	13,100	9,800	22,000	11,800	12,000
Ruddy Duck	42,700	34,000	36,100	12,100	19,800
Total Diving Ducks	**169,900**	**188,200**	**300,600**	**140,200**	**73,900**
Scoter Spp.	2,300	8,100	40,600	10,000	2,100
Long-tailed Duck	100	400	4,100	700	500
Merganser Spp.	6,500	18,700	5,100	7,000	1,700
Grand Total Ducks	**247,300**	**215,400**	**433,200**	**208,400**	**137,400**
Brant	1,500	1,300	1,700	2,400	500
Snow Goose	75,600	93,900	54,900	49,200	46,600
Canada Goose	452,900	355,200	383,400	305,400	285,700
Tundra Swan	15,100	17,900	13,200	8,200	8,700
Total Waterfowl	**798,000**	**781,300**	**889,900**	**577,100**	**478,900**

Table 3.7. Fall-Winter Peak Waterfowl Counts by Year at Eastern Neck Refuge*

Species	2003-04	2004-05	2005-06	2006-07
Tundra Swan	2251	959	815	729
Canada Goose	5069	11461	15534	8415
Snow Goose	1	14	0	0
American Black Duck	752	1375	674	831
Bufflehead	479	491	852	402
Ruddy Duck	13125	5098	1175	1400
Scaup Spp.	12482	45568	24878	7201
Canvasback	4335	1406	1200	613
Common Golden-eye	404	252	534	161
Long-tailed Duck	11	1	16	0
Hooded Merganser	9	15	30	6
Red-breasted Merganser	19	244	48	18
Wood Duck	16	13	46	139
Mallard	2498	4027	3596	2757
Northern Pintail	910	385	226	41
Gadwall	4	130	36	47
American Widgeon	10	283	373	61
Northern Shoveler	8	3	2	2
Blue-winged Teal	0	0	0	0
Green-winged Teal	35	22	12	1
Redhead	0	8	69	1
Ring-necked Duck	65	98	76	6
Unknown Waterfowl	2000	749	1025	370
Surf Scoter	0	0	98	27

**Note: Some of these counts include birds in state waters immediately adjacent to the refuge. These figures represent the peak daily count recorded for individual species over the season.*

Atlantic Population Canada Geese

Over the last decade, we averaged about 1,800 AP Canada geese per day using our refuge croplands with as many as 5,000 geese counted on a single field on one survey day. The fields also are used occasionally by black ducks and mallards and recently tundra swans have been seen using the fields. We believe that active management of croplands is important to sustaining healthy wintering waterfowl since their natural food source, including SAVs, has been severely depleted. Maintaining croplands is especially important during harsh winters because it becomes the only forage around when other farm fields are empty and water is frozen. Figure 3-1 provides a summary of crop field use by Canada geese on the refuge between 1995 and 2006.

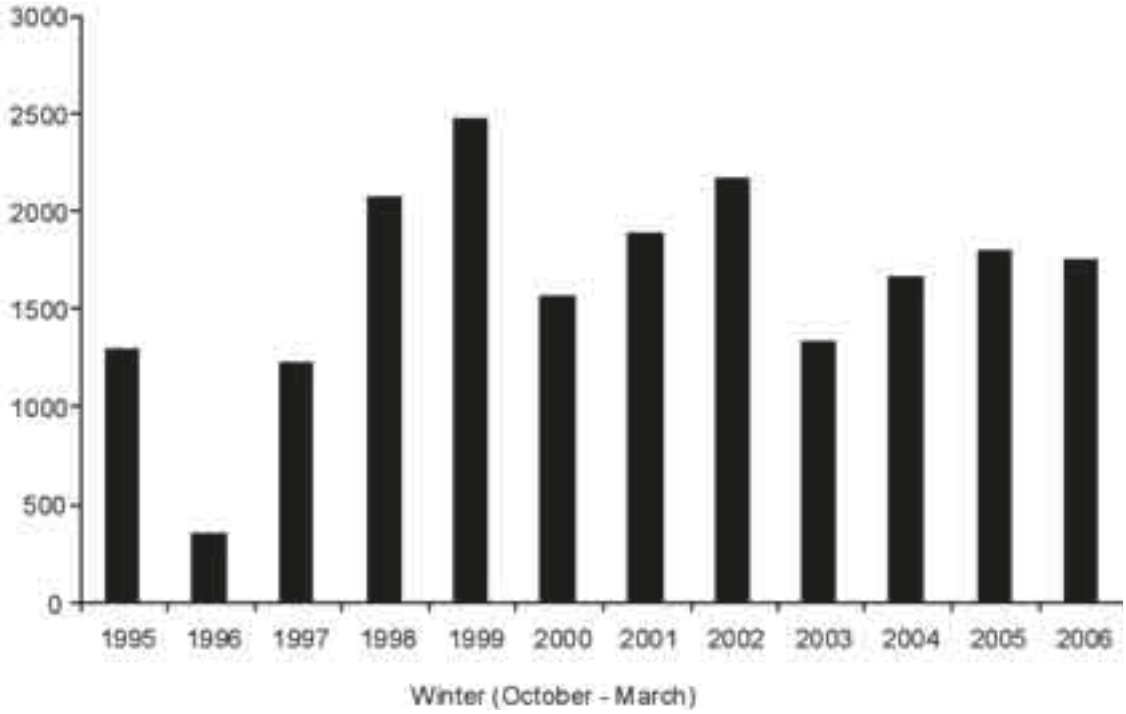


Figure 3.1. Average weekly count of AP Canada geese in crop fields at Eastern Neck Refuge

Diving Ducks
Diving ducks, such as canvasbacks, scaup and red-breasted mergansers rely on SAV, clams, invertebrates and small fish. The refuge is one of few protected areas in the Bay to provide a safe and undisturbed haven for these birds. The island's creeks and coves shelter SAV beds which have declined drastically throughout the Bay. These submerged plants are not only a food source, but provide habitat for invertebrates and small fish, also an important food resource.

American Black Ducks
The American black duck and mallard are the most abundant dabbling ducks in the Bay. Although the population of mallards is increasing, black ducks are declining. Black ducks have been identified on every regional bird list of conservation concern, including the Atlantic Coast Joint Venture. The Refuge is especially significant as wintering areas for black ducks. In the Bay, uninhabited offshore islands and remote marshes are the best black duck production areas. Development throughout the watershed has limited these habitats. The refuge provides these habitats, and most importantly, in a setting undisturbed by human development.

Tundra Swans
The refuge is a major staging site for the tundra swan on their annual migration between the Arctic tundra and North Carolina marshes. The refuge and surrounding waters is also a Global International Birding Area (IBA) for the tundra swan. Just over one percent of the global population of tundra swans have been known to spend the early part of winter on or adjacent to the refuge, feeding on SAV and clams in shallow tidal waters (NAS 2004). Many of these swans stay on or adjacent to the refuge throughout the winter, while some continue to wintering grounds in North Carolina. The refuge conducted a "Tundra Swan Watch" satellite tracking project until 2004.

Marsh and Wading Birds
Eighteen species of marsh and wading birds have been observed on the refuge (see Table 3.8) though only three are known to breed here. The refuge is considered a likely foraging area for herons from nearby rookeries.

Table 3.8. Eastern Neck Refuge Marsh and Wading Birds Seasonal Abundance*

	Breeding	Spring	Summer	Fall	Winter
BITTERNS - HERONS - IBISES					
American Bittern		r	r	r	r
Least Bittern		r	r		
Great Blue Heron		c	c	c	u
Great Egret		o	o	o	
Snowy Egret		o	o	o	
Little Blue Heron		r	r	r	
Tricolored Heron		r	r	r	
Cattle Egret		o	o	o	
Green Heron	X	u	u	u	
Black-crowned Night-Heron		r	o	o	r
Yellow-crowned Night-Heron		r	r	r	
Glossy Ibis			r	r	
RAILS - CRANES					
Clapper Rail		r	r	r	
King Rail	X	o	o	o	o
Virginia Rail	X	u	u	u	u
Sora		r		r	r
Common Moorhen		r	r	r	
American Coot		o		u	o

***RELATIVE ABUNDANCE:** *a/abundant, c/common, u/uncommon, o/occasional, r/rare.*

Raptors
In addition to the bald eagle and the BCC-listed peregrine falcon and short-eared owl, 20 other raptors have been observed here (table 3.9). Seven raptors breed at the refuge: bald eagle, osprey, black and turkey vultures, red-tailed hawk, eastern screech owl, and great-horned owl.

Table 3.9. Raptors of Eastern Neck Refuge and Their Seasonal Abundance*

Species	Breeding	Spring	Summer	Fall	Winter
Black Vulture	X	u	u	u	u
Turkey Vulture	X	a	a	a	a
Osprey	X	a	a	c	
Bald Eagle	X	c	u	c	c
Northern Harrier		u		u	u
Sharp-shinned Hawk		u		c	u
Cooper's Hawk		u		u	u
Northern Goshawk				r	
Red-shouldered Hawk		o	o	o	o
Broad-winged Hawk		o		o	
Red-tailed Hawk	X	u	u	u	u
Rough-legged Hawk		r		r	r
Golden Eagle		r		r	r
American Kestrel		u	r	u	u
Merlin		r		o	r
Peregrine Falcon		r		o	r
Common Barn Owl		r	r	r	r
Eastern Screech Owl	X	u	u	u	u
Great Horned Owl	X	u	u	u	u
Barred Owl		r	r	r	r
Short-eared Owl		r		r	r
Northern Saw-whet Owl				r	r

**RELATIVE ABUNDANCE*: *a/abundant, c/common, u/uncommon, o/occasional, r/rare.*

Forest Birds

Forested upland communities in the region provide breeding and migrating habitat for a wide array of species, including the second highest number of priority bird species in the region (USFWS 2007b). Of particular concern to researchers and land managers, are those bird species considered "forest interior dwelling" (FIDs). Virtually all have documented population declines. FIDS are Neotropical migratory birds which require large contiguous forested tracts (> 100 acres) to maintain viable breeding populations. The refuge's forested tracts are on the minimum size of, or do not meet, suitability for most breeding

FIDS. However, there are a few species that breed in low densities on the refuge. These include wood thrush, eastern wood peewee, northern flicker, and scarlet tanager. Many more species seek shelter or forage on the refuge during migration. Appendix A lists species of conservation concern known on the refuge.

Grassland Birds
The limited grassland habitat on the refuge, and its small patch size, precludes nesting by most grassland birds because many are area sensitive. Of the 20 bird species associated with grassland habitats in Maryland and listed as of greatest conservation need by MD DNR, 10 have been observed on the refuge (table 3.10). Only one species, the field sparrow, is known to breed here. However, the refuge's grasslands do provide foraging and migrating habitat to many birds, including some noted in table 3.10 that are of conservation concern in the area.

Table 3.10. Maryland Greatest Conservation Need grassland birds at Eastern Neck Refuge.

	Breeding	Spring	Summer	Fall	Winter
American Woodcock		o	r	o	r
Common Barn Owl		r	r	r	r
Short-eared Owl		r		r	r
Sedge Wren		r	r	r	r
Field Sparrow	X	u	u	u	u
Vesper Sparrow		r	r	r	r
Savannah Sparrow		u		u	u
Grasshopper Sparrow		o	o	o	
Bobolink		u		u	
Eastern Meadowlark		o		o	o

Shrubland Birds
Similar to our discussion for grassland birds, the limited shrub habitat on the refuge and its small patch size, precludes nesting by most shrub-dependent birds. We know of two bird species of conservation concern that nest in low densities on the refuge, the yellow breasted chat and the white-eyed vireo. We suspect their populations are very small. As with grasslands, however, shrub habitat does provide foraging and migrating habitat to many birds.

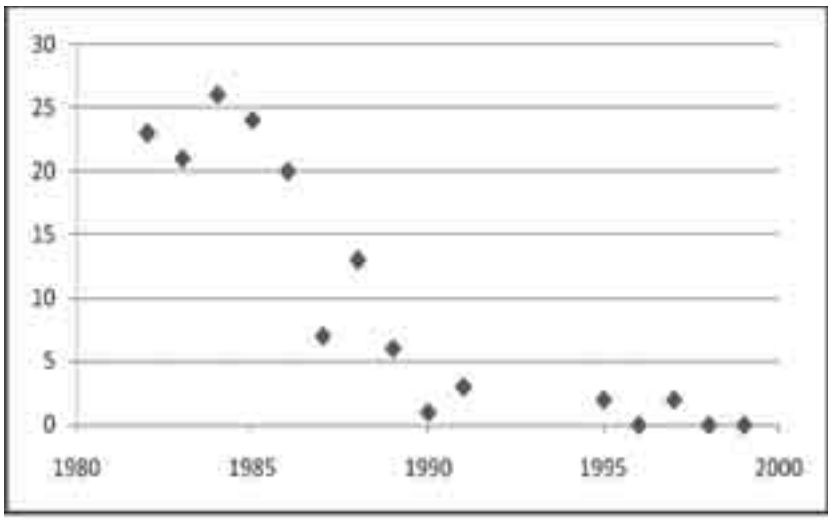
Federal-listed Threatened and Endangered Species
The Delmarva fox squirrel (DFS) is the only Federal-listed species documented on the refuge. The recently delisted bald eagle also occurs here and remains protected under other mandates. The refuge has been evaluated for northeastern beach tiger beetle and Puritan tiger beetle, but no beetles were found, and the refuge is not considered quality habitat for either.

Delmarva Fox Squirrel
DFS were introduced on the refuge in the 1920s by local hunters. The historic range of the DFS included the entire Delmarva Peninsula, but the range was reduced over time by habitat loss and hunting. By 1967, populations were found in only four Eastern Shore counties—Kent, Queen Anne's, Dorchester, and Talbot counties, and the DFS was Federal-listed as endangered.

The squirrels were abundant on the refuge until the 1980s. While the population size through the 1980s was only estimated, they were sufficiently abundant to enable removal of 22 individuals to start the Chincoteague refuge population in 1968. A mark-recapture study of this species was conducted between 1982 and 1986 by a research graduate student; and from 1994-1998 refuge staff conducted a mark/recapture box check/trapping survey as part of a survey of benchmark sites designated by the Recovery Team. Trapping efforts (see figure 3.2) were discontinued after 1999 due to poor trapping results. Only two DFS were sighted in 2003.

Since that time, sightings are a rare occasion, generally only 1 per year. According to the Service's Recovery Team Leader, we do not know why the DFS population on Eastern Neck Island declined. It is hypothesized that a decrease in deer populations and/or that the removal of DFS from the refuge to seed the Chincoteague refuge population might be reasons. An average density of a healthy population of DFS is 0.3 DFS/acre of mature forest.

Figure 3.2. Delmarva fox squirrels captured at Eastern Neck Refuge, 1982-1999

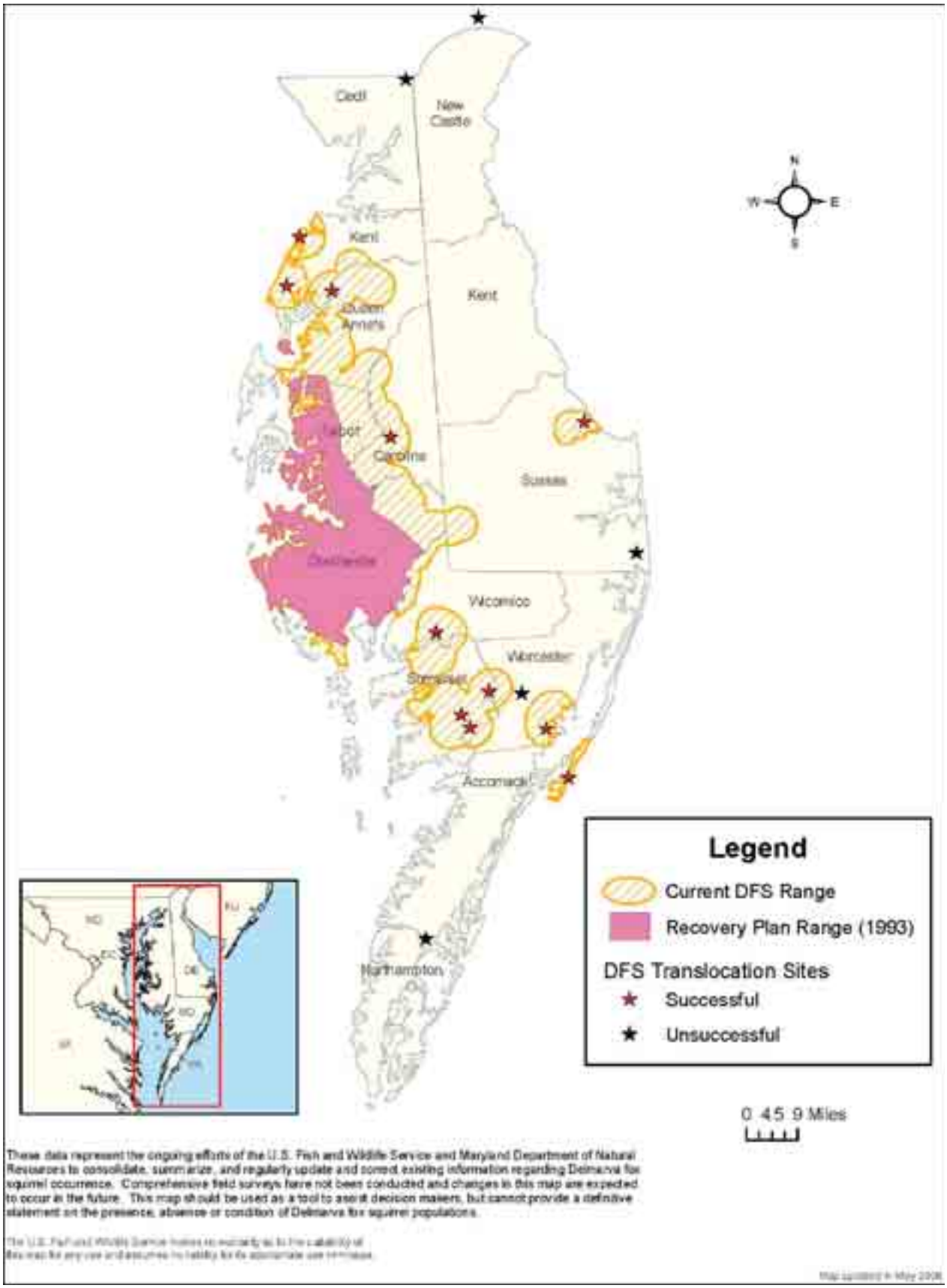


In addition, a population viability analysis for DFS suggests that it takes at least 130 animals to provide a stable population (e.g. less than 5 percent chance of extinction in 100 years) (Hilderbrand et al. 2007). It is unlikely that the refuge ever sustained these numbers and densities. Also, the problem with any island population is that stochastic (random) events can drive populations to extinction and there are no adjacent populations to recolonize the site or provide new individuals (Keller, personal comm. 2006).

For these reasons, over the last five years, we have not pursued active management for this species, including translocations back to Eastern Neck Refuge. Together with the DFS Recovery Team, we have determined that the refuge population is not deemed essential to DFS recovery. Any additional translocations of DFS would be more effective in other locations within its range.

While loss of the population on the refuge seems dramatic and severe, the good news is that DFS translocations to other sites in Kent County and elsewhere on the Delmarva Peninsula have been very successful (CBFO 2007) and those populations are expanding (map 3.5). The species is now on the brink of recovery and all of this past effort has led the way for this response.

Map 3.5. Recent changes in the range of the Delmarva fox squirrel



Mammals
In addition to the DFS, 18 species of mammals are known to occur on the refuge (appendix A). White tailed deer, gray squirrel, raccoon, and muskrat are the most commonly seen.

Amphibians and Reptiles
The waters and land of the refuge are home to a wide variety of amphibians and reptiles. These are listed in appendix A and described further below.

Amphibians
The refuge hosts populations of green frogs, upland chorus frogs, spring peepers, wood frogs, bull frogs, green tree frogs, gray tree frogs, Northern cricket frogs, Fowler's toads, American toads, and both Northern and Southern leopard frogs. Dr. James F. White, Jr., author of the "Amphibians and Reptiles of Delmarva" field guide, reported seeing a state-listed endangered Eastern narrow-mouthed toad *(Gastrophryne carolinensis)* near the causeway at the refuge on March 13, 2003.

Reptiles
The refuge is inhabited by the common five-lined skink, nine common snakes, and six common freshwater/upland turtle species. The northern diamondback terrapin, which lives in brackish water, and the box turtle, are both species of high conservation concern in Maryland. Two sea turtles occurring in the waters surrounding the refuge are also listed by Maryland as species of conservation concern: the Federal-listed threatened loggerhead sea turtle (*Caretta caretta*), and the Federal-listed endangered leatherback sea turtle (*Dermochelys coriacea*).

Eastern box turtle

John Mosesso, Jr./NBII

Once abundant in the Bay, northern diamondback terrapins (*Malaclemys terrapin*) are declining due to loss of nesting habitat due to waterfront development, erosion control measures, and invasive species; loss of SAV beds providing foraging habitat; commercial harvesting in the areas in which terrapins reside during winter months; mortality from boating and fishing (physical impacts and by-catches); and rising predator populations. Until recently, terrapins represented an active commercial fishery managed by the MD DNR. In 2007, Maryland acted to protect diamondback terrapins. Effective July 1, 2007, it became unlawful to take or possess them for commercial purposes and recreational harvest was limited to 3 per person (Chapters 117 & 118, Acts of 2007; Code Natural Resources Article, sec. 4-902).

Insects
Beetles
Prior to the 2003 release of "Beetles of Eastern Neck Island" (BENI), very little was known about insect populations on the refuge. The BENI biodiversity inventory project involved citizen-scientists as both investigators and educators in biotic surveys. BENI surveys were conducted from March through August, 2003. Collections totaled 413 species of beetles from 56 families, over half the known 102 beetle families in eastern North America. These specimens included 43 vernal pool species (nearly half of the 83 species known to occur in the Delmarva Peninsula), including one State candidate for threatened and endangered listing. Of the 11 species of tiger beetles known to occur on the Delmarva Peninsula, five

were found on the refuge. The project also established a database of 1,000 records and a voucher collection of over 400 specimens.

A related study—"The Diversity and Abundance of Ground-Inhabiting Beetles in Four Different Habitats of Eastern Neck Island"—concluded that cultivated fields were the least diverse habitat and provided the lowest abundance of ground beetles. Transition zones were the most diverse habitat and with the highest abundance and species diversity. Fallow fields and woodlands were moderate in numbers of species and diversity.

Ticks
In 2003, a student investigated the prevalence of Borrelia (B.) burgdorferi, the bacterium responsible for Lyme disease, in ticks (*Ixodidae*) collected from deer carcasses at the refuge's hunt check station. The study collected ticks from 31 deer during the refuge's fall hunts. Three species of *Ixodidae* were found: dog tick (*Dermancentor variabilis*), Lone Star tick (*Amblyomma americanum*), and deer tick *(Ixodes scapularis*).

In total, 90 samples (86 ticks and 4 groups of eggs) were analyzed for B. burgdorferi, and 10 tested positive for the bacterium. All of the infected ticks were from the 79 samples of *I. scapularis*: 73 adults (9 positive) and 2 nymphs (1 positive). The study, therefore, represented that 13 percent of the deer ticks collected on the refuge carried the bacterium.

Butterflies and Moths
Five separate surveys conducted during 1998 and 1999 identified 36 butterfly and moth species on the refuge. Appendix A provides a list of those observed. Two surveys in 2003 were done to identify moths on the refuge and provide specimens for the refuge collection.

Aquatic Species
Appendix A lists the aquatic species of interest that occur within the vicinity of the refuge in the Lower Chester River Basin. Fish such as shortnose and Atlantic sturgeon are included, as are American eel, alewife, American and hickory shad, and blueback herring. Shellfish species of interest that occur within the vicinity of the refuge include the American oyster, blue crab, and horseshoe crab. A brief description follows.

American Oyster
The American oyster ***(****Crassostrea virginica)* occurs in the Chester River and resides primarily in oyster bars on the eastern side of the refuge.

Blue crab
Blue crab *(Callincetes sapidus)* is an interjurisdictional species found in the Chester River. During the winter months, the blue crab occurs in low densities and is distributed in the refuge marshes and surrounding waters. In the summer, blue crab density is much higher and is distributed along the entire refuge. Spawning for this species occurs during the summer surrounding the refuge.

Horseshoe crab
The horseshoe crab *(Limulus polyphemus)* is another interjurisdictional species in the area known to spawn in shallow waters just off and occasional on the refuge. This crab is identified in the Service's Northeast Regional Strategic Fish Plan as a species of high conservation concern. In June 2009, refuge staff began a tagging program to learn more about the local horseshoe crab population. Biologists from state and federal agencies across the range of this species participate in this cooperative tagging program. Tag return data provides

information about horseshoe crab migration patterns, distribution, abundance, and mortality, which informs the management of horseshoe crab populations.

Invasive Species
We describe pest species, including invasive plants and injurious and invasive wildlife species, in more detail in chapter 4, under "General Refuge Management", subheading "Control of Pest Plants and Animals."

Plants
Non-native or exotic plants introduced from other parts of the world or other parts of the country have degraded many natural ecosystems. Invasive plants can spread rapidly and smother or out-compete native vegetation. The refuge currently has 15 invasive plants; four are considered invasive species of major concern—*Phragmites australis,* Johnsongrass, Canada thistle, and mile-a-minute weed. Plants identified as invasive during a 2006 survey of the refuge are listed in table 3.11. Invasive species of concern are actively controlled by refuge management in partnership with Integrated Vegetation Management Partners, a non-profit organization, and the Chesapeake Wildlife Heritage. The refuge tracks the spread and control of invasive plants utilizing Geographic Information Systems (GIS), Global Positioning Systems (GPS), the Weed Information Management System (WIMS), permanent vegetation monitoring plots, and photo points. In 2006, 400 out of a reported 1,250 acres of land infested with invasive plants were treated on the refuge. Treatment successfully controlled invasive plants on 50 of these 400 acres. The refuge is currently conducting a study to determine the efficacy of a series of control measures on five invasive plant species by monitoring for five seasons (summer/fall) post treatment from 2007 to conclude fall 2011.

Injurious and Invasive Wildlife
Mute swan and resident Canada geese are present at the refuge and managed according to State of Maryland requirements for their control. Mute swan numbers have increased in recent years and we have continued our efforts, in partnership with MD DNR, to eliminate them from the refuge. Annual mute swan counts in recent years were 130 (2005–2006), 168 (2004–2005), 61 (2003–2004).

Table 3.11. Invasive Plant Species on Eastern Neck Refuge

Common Name	Scientific Name	Common Name	Scientific Name
Common Reed	*Phragmites australis*	Autumn Olive	*Elaegnus umbellata*
Johnsongrass	*Sorghum halepense*	Princess Tree	*Paulownia tomentosa*
Canada Thistle	*Cirsium arvense*	Chinese Lespedeza	*Lespedeza cuneata*
Multiflora Rose	*Rosa multiflora*	English Ivy	*Hedera helix*
Mile-a-minute	*Polygonum perfoliatum*	Garlic Mustard	*Alliaria petiolata*
Wineberry	*Rubus phoenicolasius*	Common Mullein	*Verbascum thapsus*
Japanese Stilt-grass	*Microstegium vimineum*	Tree of Heaven	*Ailanthus altissima*
Japanese Honeysuckle	*Lonicera japonica*		

Archeological and Historical Environment

Overview
Several archaeological surveys have been performed on the refuge since 1978. However, that work was limited to intermittent series of studies for construction

of trails, improvements to office, quarters, and maintenance facilities, and habitat improvement projects. Surveys to date have identified a total of 79 archaeological sites. Thirty-two of them date between 600 B.C. and English settlement of the island in the year 1658. Another 47 of them date between 1658 and the 1930s. Human remains have been discovered at two sites, and it is likely that more exist. The geographic density of known pre-contact sites is remarkable for an area the size of Eastern Neck Island. Many sites of varying time periods are on slight rises of ground adjoining current or former seasonal wetlands and watercourses. However, there has never been any overview study to develop a model of likely archaeological site locations, and it is unclear how many additional undiscovered sites exist. In addition to archaeological resources, two early 20th century structures associated with a waterfowl hunting club still stand on the refuge.

Past impacts to archaeological sites on the refuge have occurred from a variety of causes. Most historic period structures on the island were demolished by private owners in the early 20th century or by the Service shortly after establishment of the refuge in the 1960s. Those activities also sometimes damaged archaeological resources associated with early plantation sites. Human remains eroding from one Pre-Contact site were recovered by archaeologists in 1980 and reburied on the refuge by a Native American group. A number of other sites recorded in a 1978 archaeological study were found to have been completely lost to coastal erosion 15 years later. Several others are actively eroding today. Further inland, many sites (including at least one burial) are in areas that were historically tilled. Some are still tilled, and exhibit deflation by wind erosion. All sites on the refuge are now protected by the Archaeological Resources Protection Act, which contains both misdemeanor and felony provisions for prosecution of looting on federally managed land. Despite that legal protection, artifact collecting in plowed fields and digging in sites along the shore have been recurring problems over at least the last 20 years, especially in the boating season and when tilling is underway. This is particularly damaging to the resource. Not only does the artifact itself disappear, but the larger story it could have told if its location had been accurately plotted is also lost forever.

Pre-contact Archaeological Resources

Initial human occupation on the Eastern Shore of Maryland appears to date from about 14,000 years ago. While no archaeological sites from that period have been identified on the refuge, several have been found elsewhere on the Eastern Shore. Eastern Neck Island would have been suitable for occupation at that time, as well as in what archaeologists call the "Early Archaic Period (11,500 to 8,000 years ago). The earliest sites identified on the refuge date to the "Middle Archaic Period" (ca. 8,000 to 5,500 years ago), and appear to represent small camps for fishing, plant gathering, and hunting of game and waterfowl. Some "Late Archaic Period" sites (ca. 5,500 to 3,000 years old) are also present. These occasionally contain oyster shell, reflecting stabilization of the nearby marine environment and exploitation of a newly reliable food resource by island inhabitants. By the Woodland Period, ca. 3,000 to 350 years ago, shell-fishing had become a major activity, and corn agriculture also appeared on the island. By that time, the size and shape of the island was probably similar to today, though the acreage and configuration of portions lost to coastal erosion is unknown. One Woodland Period site on the island covers a considerable area and may have been a small village occupied year round by several families. Reconstruction of a "Townsend Style" ceramic pot from that site was arranged between Washington College's Archeology Department and the Service's Region 5 Museum Property Coordinator in 2003. It is currently on display in an exhibit case in the visitor contact station.

Captain John Smith explored this part of the Bay in 1608 and made the first recorded contact with the Ozinies, a branch of the Algonquin-speaking Nanticokes, at a landing point just across the narrows. Smith identified their primary village as somewhere on the lower Chester River, with a population including 60 warriors. After decades of tension, open warfare broke out between the Ozinies and Maryland colonists in 1642 and persisted intermittently until 1678. Though warfare and diseases introduced by European contact decimated the Ozinie population, they may have descendants in Nanticoke groups on the Eastern Shore today.

Historic Period Archaeological Resources

In 1658, Joseph Wickes and Thomas Hynson were granted the southern and northern halves of Eastern Neck Island, respectively, and both quickly established plantations with substantial dwellings and numerous outbuildings. Wickes' plantation was named "Wickliffe." Limited archaeological and archival research indicates that its original farmstead buildings were near the current refuge quarters.

In addition to family members, each plantation included an enslaved African American population of about a dozen adults and children, as well as indentured servants. While tobacco was a major crop in the first century of occupation, a substantial amount of corn was also grown and the farms kept a wide variety of livestock. Probate records indicate an unusually high number of riding horses, perhaps bred for sale. Both families owned a variety of vessels, ranging from log canoes to a sloop that engaged in trading voyages to the Caribbean. The Wickes' also owned a shipyard, the site of which has never been archaeologically investigated.

Both the Hynson and Wickes families were economically, socially, and politically prominent in Kent County for some time. County Court was held in Chief Justice Joseph Wickes's home until a courthouse was built in the county's first settlement at New Yarmouth. Joseph Wickes' most famous descendant was his great grandson, Captain Lambert Wickes. He carried Benjamin Franklin to France in 1776 aboard the Continental Navy brig "Reprisal" to seek French support for the American Revolution. Captain Wickes and all but one of his crew were lost at sea in 1777, after a short but distinguished career in which he captured numerous British merchantmen and engaged several enemy naval vessels. A small monument stands near the birthplace of Captain Wickes and is located near the south end of the refuge. During the course of the 18th and early 19th century, the original Wickes and Hynson plantations were eventually divided into smaller parcels by heirs or sold out of the families. The additional large plantations built during that time, such as Samuel Wickes' home and Spencer Hall, included impressive dwelling houses. By the late-19th century, there were several smaller farms and tenant houses on the island, as well as a school. A small fishing village with an oyster-shucking plant grew up at Bogles Wharf, where the Chester River Steamboat Company provided regular service to Baltimore.

Historic Period Structures

In the early 20th century, wealthy individuals from surrounding cities were attracted to the area by its notable concentrations of waterfowl and bought portions of the island for hunting retreats. The only remaining waterfowl hunting lodge, built in 1933, still stands and has been determined eligible for inclusion in the National Register of Historic Places. It was recently rehabilitated for use as the refuge headquarters and visitor contact station. The current refuge quarters was built in 1934 as a year-round residence for the caretaker of the hunting club property. Although it is a fairly commonplace early 20th century house, it may

eligible for National Register inclusion because of its association with the hunting club and lodge.

In the 1950s, a developer bought a large tract on the west side of the island and subdivided it into 293 small lots for a housing development. The Service, responding to concerns over the development expressed by the local community, acquired the entire island between 1962 and 1967 to preserve its valuable wildlife habitat. The former refuge office was built around 1960, and is now used as seasonal housing. It is the only house ever built in the "Cape Chester" subdivision. It is not National Register eligible.

Museum Property

Over the years, the refuge acquired by various means a number of archeological and historical objects which are considered 'museum property" under Department of the Interior regulations. Some of those objects are currently stored in the Service's regional office, while others are on display in the exhibit at the visitor contact station. In 2007, archaeological material from 1978 and 1980 studies by Catholic University was transferred to the Maryland Archeological Conservation Laboratory for rehabilitation, identification, cataloguing, and storage. They will remain there, available for examination by researchers, as part of a permanent collection stored to meet federal preservation standards.

Visitor Services and Programs

The following principles have guided our management of public use on the refuge:

- Promote the refuge message, thereby enabling the visitor to have a more enjoyable experience and perhaps helping to reduce the impacts on other wildlife areas.
- Provide teacher-led environmental education opportunities.
- Increase self-service opportunities to better educate the public and promote the refuge message using informational panels, brochures, and refuge website.
- Provide compatible opportunities for wildlife observation, wildlife photography, hunting, and fishing.
- Provide professionally produced interpretive information at appropriate locations.
- Improve the training of staff and volunteers to enable them to provide quality interpretive experiences for the public that convey the refuge message.
- Maintain and improve visitor facilities to ensure that high quality experiences of different levels and abilities that are safe, enjoyable, and educational are available to the public.
- Conduct effective outreach and work with State and local organizations to provide wildlife-dependent recreational facilities that enable the visitor to enjoy the refuge without adversely affecting either wildlife or wildlife habitat.

Visitor Numbers

In 2007 there were 55,000 visitors to the refuge. Refuge visitors primarily arrive by car. Bicycles are permitted on paved and gravel roads designated open to the public. Non-consumptive activities were the most popular. Most of the visitors came to walk on nature trails, observe and photograph wildlife, or enjoy the BayScape garden. Of consumptive users in recent years, approximately 420 were associated with hunting; 27 were associated with freshwater fishing in the refuge pond; and, 6,000 were associated with saltwater fishing. About 60 percent

of all visits are by non-residents. Visitors are drawn primarily from the nearby metropolitan areas of Washington, D.C., Baltimore, MD and Philadelphia, PA (USFWS 2007d).

Visitor Facilities and Programs

The Visitor Contact Station and Friends of Eastern Neck Bookstore are located in the lodge, which also serves as the refuge administrative headquarters. The bookstore is open every day of the year except on certain Federal holidays, during deer hunts and any other special management activities. In addition to the bookstore and offices, visitors can view exhibits explaining the history of the island. A diorama also shows an example of wetlands habitat on the refuge. In the rear of the lodge, visitors can sit and relax with a reference book or request to view one of the many videos on hand. Loaner binoculars, which enhance visitors' observation experiences, are available at the Friends of Eastern Neck Bookstore. Bay Bio cards are also available at the bookstore. These cards assist visitors in learning about the variety of wildlife they may observe while on the refuge. Outside are public restrooms and a deck with chairs and a picnic table. A small conference room is at the rear of the lodge. Refuge interpretive brochures and leaflets are available here, including: refuge bird lists; an interpretive leaflet about the refuge trails; a water trail map and guide; historic information about the lodge and Eastern Neck Island; a Friends of Eastern Neck brochure and quarterly newsletter; and the results of the weekly waterfowl survey.

The refuge is part of the Chesapeake Country National Scenic Byway and Captain John Smith Chesapeake National Historic Water Trail.

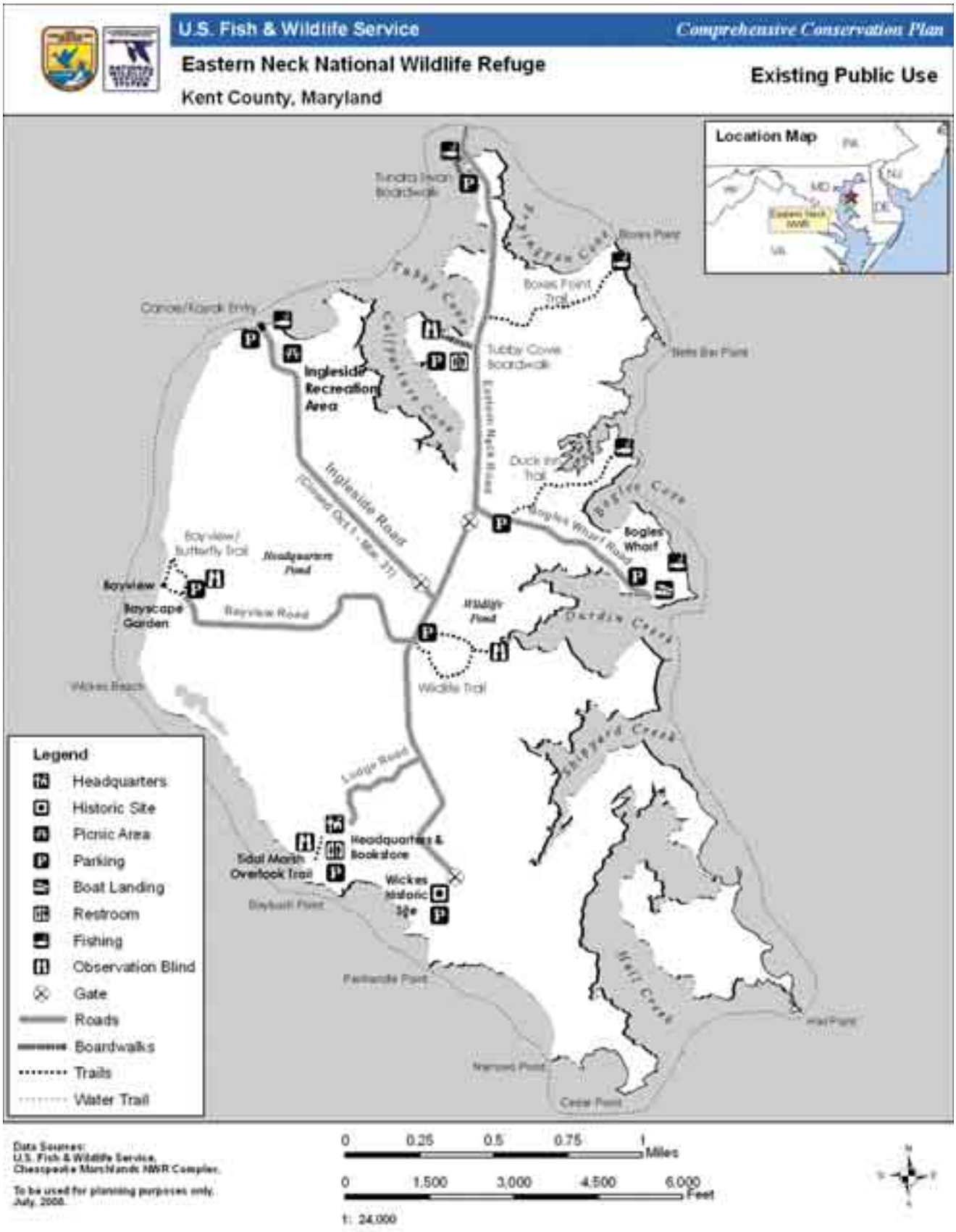
We offer activities and programs in each of the six priority public use programs: wildlife observation and photography, environmental education and interpretation, and hunting and fishing. In the discussion that follows, we describe facilities that support these programs which are also depicted on map 3.6.

Tundra Swan Boardwalk. This 140-foot facility provides visitors a perfect site for watching the staging tundra swans and other waterfowl in the winter and for fishing and crabbing in the summer. Permanently mounted scopes, benches, and a seasonal waterfowl identification panel are also a part of this universally accessible boardwalk. A kiosk with two interpretive panels, brochure holder and locking display case are at the foot of the boardwalk in the parking lot.

Boxes Point Trail. Located a short distance north of the Tubby Cove parking area, this broad trail begins along the border between the forest and marsh, then bends to reveal an agricultural field on the right where migratory Canada geese often gather in the fall and winter. From there the trail enters a forest of mixed evergreens and deciduous trees with a very open under story. The forest fades to marsh as the trail nears its end at Boxes Point on the bank of the Chester River. A bench provides a resting place for hikers. Waterfowl, including tundra swans, are often visible here in the late fall, winter, and early spring. The trail is 1.2 miles round-trip.

Tubby Cove Boardwalk. From the Tubby Cove kiosk and parking area, this boardwalk extends over a healthy, diverse marsh to a wooded island. Once on the island, the boardwalk passes through a stand of loblolly pines. The main path leads to a universally-accessible enclosed observation blind. Another short trail extends from the main path to an elevated observation platform providing a view of the Bay and into Calfpasture Cove and Tubby Cove. The boardwalk is less than 1/4-mile round-trip. A kiosk with six interpretive panels, a brochure holder and a locking display case is located near the road at the parking lot. Universally-accessible restrooms are also located at the parking lot.

Map 3.6. Eastern Neck Refuge visitor facilites



Duck Inn Trail. From Bogles Wharf Road., this trail begins in a wooded area dominated by loblolly pine and bordered by marshes. In this section, evidence of previous prescribed fires is visible. The trail then moves into a field dominated by tall grasses and open marsh. Finally, the trail moves through an area of scattered loblolly pine and deciduous trees before ending at the bank of the Chester River. The shore is composed of an oyster midden and looks east over the river. Waterfowl may be visible in the river during late fall, winter, and early spring. Migratory songbirds are abundant along the trail during spring and fall migrations. The trail is a 1-mile round-trip.

Bogles Wharf. This area is owned and managed by the Kent County Department of Recreation. A boat trailer permit is required to use the boat launch. Fishing piers and a shoreline area are available for fishing and crabbing. Portable restrooms, provided by Kent County, are available seasonally. This area is also one of the launch sites for the water trail around the island in state waters.

Bogles Wharf at sunset

USFWS

Ingleside Recreation Area. This bayshore area is managed by the Kent County Department of Recreation. Open from April 1 through September 30, this area is great for crabbing and fishing. A kiosk with two interpretive panels, a locking display case and a brochure holder is located near the picnic area parking lot. Picnic tables and portable restrooms, provided by Kent County are available seasonally

Wildlife Trail. This ½-mile loop trail begins and ends at a trailhead on the main refuge road. The trail never leaves the forest, although it passes close to wetlands in several places. A spur of the trail extends off the main path to an enclosed observation blind overlooking a marsh. Songbirds are plentiful along this wooded trail, particularly during fall and spring migrations. A kiosk is located in the parking lot.

Headquarters Pond. Located on the gravel road to the Bayview-Butterfly Trail, this pond offers visitors a variety of wildlife viewing opportunities depending on the season. Beaver, bald eagles, herons, kingfishers, and wild turkey are often reported. There are also a few osprey platforms visible along the road providing a pleasant wildlife viewing opportunity.

Bayview-Butterfly Trail. From the Cape Chester House parking lot this 1/3-mile universally-accessible loop trail extends through restored grassland to a deck overlooking the Bay and a breakwater project, complete with benches and two binocular viewers. The trail then travels to an enclosed observation blind at the edge of a wooded pond before passing through a young forest and finally through the restored grassland and back to the parking lot.

BayScape Garden and Demonstration Area. Located behind the Cape Chester House, this volunteer-tended garden was created in 2001. It also serves as a BayScape demonstration area educating visitors on how to protect the Bay by utilizing native plants and other landscaping features instead of mowed lawns, or potentially invasive ornamentals. Initial planting and subsequent maintenance of the demonstration area is funded by the Chesapeake Bay Trust. Plants are fertilized with organic "leaf-gro" to avoid runoff of excess fertilizers. Irrigation is provided through a pressure-regulated drip system that significantly minimizes water use compared to traditional sprinkler systems. Through a network of tubes under the mulch, water is delivered directly to the ground, rather than sprayed on plant leaves and ground surface, where it can evaporate. The conservation garden also offers a site for exploration and education.

In 2007 it was given the Bay Wise designation by the Master Gardeners of Queen Anne's County MD Cooperative Extension. The garden is active most months of the year. During the spring and fall, thousands of butterflies can be seen throughout the garden.

Tidal Marsh Overlook Trail. Located behind the Refuge Visitor Contact Station, this universally accessible boardwalk meanders through a native meadow to an observation blind overlooking the Chester River and Kent Island. In early morning, waterfowl and other water birds are often visible in the pool just beyond the photo blind. This trail and viewing area is closed when the Visitor Contact Station is closed.

Wickes Historic Site. This site provides benches and has a state historic marker commemorating the life of Captain Joseph Wickes and his home "Wickliffe."

Eastern Neck Island Water Trail. This trail actually lies in State waters, but the refuge provides car-top access at Ingleside Recreation Area. Visitors can also access the trail via the county boat launch at Bogles Wharf. The trail, established in October 2006, includes seven interpretive signs along the shoreline. Waterproof trail maps are available for purchase at the Friends Bookstore. This trail connects scenic, historic and wetland restoration sites around the island for the wildlife-dependent recreational and educational benefit of paddlers. It consists of several points of interest such as restored wetlands, historical locations, hiking trails, access locations and other recreation areas all displayed in a map-and-guide format.

Hunting

Public hunting of white-tailed deer and a youth wild turkey hunt are permitted on the refuge on specific days that are annually designated by the refuge manager

in cooperation with the Maryland DNR. Hunters must purchase a state license, as well as a refuge permit, to hunt on the refuge. Hunting of waterfowl is not allowed on the refuge.

White-tailed Deer Hunt
The refuge has held an annual white-tailed deer hunt since the refuge was first staffed in 1966. The hunt serves not only to keep the deer within the capacity of the habitat to support them, but also offers a wildlife-dependent recreational opportunity, when such opportunities are becoming harder to find as a result of increasing land development.

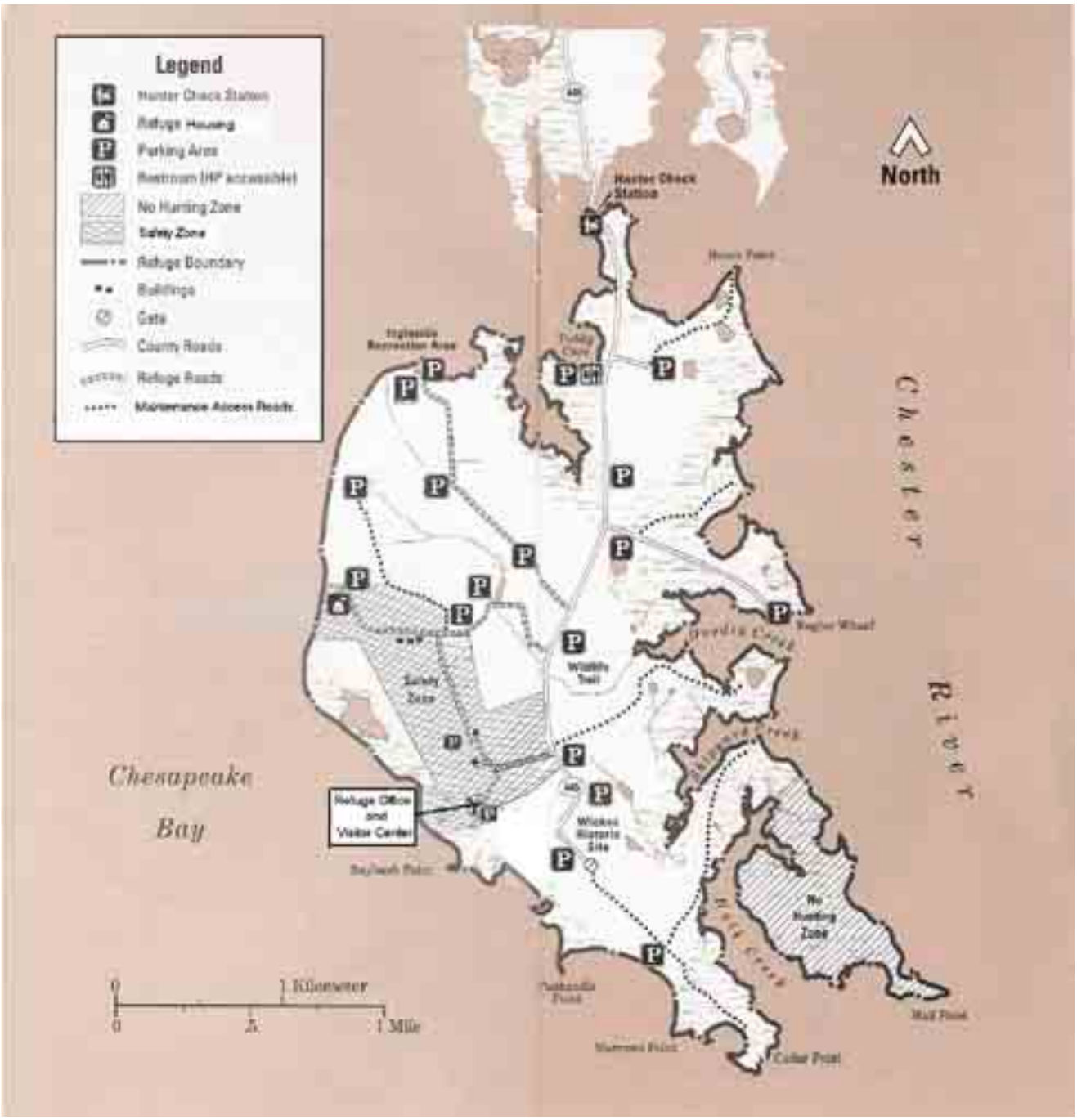
Each year the refuge submits an annual hunt program for regional review before July 1 and publishes refuge-specific regulations in the Federal Register and in 50 CFR Part 32. The annual deer hunt includes one youth day, one disabled hunt day, one archery hunt day, two shotgun hunt days and two muzzleloader hunt days. Up to 600 adult and 50 youth hunters are the maximum permitted each year. The number of hunters, deer harvested and percent success over the last 10 years is included as Table 3.12. A $10 fee is required to apply for a refuge permit. Senior citizens receive a 50 percent discount on these fees if they possess a Senior Pass which is part of the Federal Recreational Lands Pass Program.

Table 3.12. Number of Hunters and Deer Harvested on Eastern Neck Refuge from 1997-2008.

Year	Number of Hunters	Deer Harvested
1997	920	242
1998	758	78
1999	702	221
2000	584	65
2001	480* (est)	66
2002	430	63
2003	480* (est)	96
2004	480* (est)	81
2005	413	74
2006	413	97
2007	462	90
2008	426	86

Hunting times and areas are regulated to eliminate conflicts with sensitive wildlife and to ensure compatibility with refuge purposes. Over 80 percent of the refuge is open to hunting (Map 3.7), with a ratio of approximately one hunter per 20 acres. Numerous parking areas help to distribute the hunting pressure throughout the refuge. The refuge is closed to visitors other than permitted hunters during the hunt days but access to Bogles Wharf is still allowed. Staff and volunteers operate a check station at the entrance to the island during the hunts. The hunters are given an orientation at check in and provide age, sex, and weight data of any deer harvested at check out. Hunt leaflets, regulations, and maps are published annually and distributed to hunters. No specific area is designated for wheelchair-bound or disabled hunters.

Map 3.7. Eastern Neck Refuge deer hunt program



Wild Turkey Hunt
The first turkey observation on the refuge occurred in 1996. Since that time, the turkey population has steadily increased. A two day youth turkey hunt was established in 1999 to provide youth hunters the opportunity to participate in a high quality wildlife-oriented public use. From 1999 to 2006, the number of youth hunters has varied from 4 to 8. On the average, one to five turkeys are harvested annually with a high of five turkeys harvested in one year (2007).

This hunt is conducted in partnership with the Wild Turkey Federation. Refuge staff advertises and selects the youth hunters and volunteers from the Wild Turkey Federation guide the young hunters. The turkey hunt is conducted in four designated refuge zones (map 3.8). One hunt party is place in each of the four designated zones. The refuge is closed to visitors other than permitted hunters during the hunt days but access to Bogles Wharf is still allowed. Staff and volunteers operate a check station at the entrance to the island during the hunts. The hunters are given an orientation by refuge staff on the evening prior to the hunt.

Fishing
In 2006, we estimated that 6,026 visitors used the refuge to fish. Kent County manages the Ingleside Recreation Area and Bogles Wharf landing within the refuge. The Ingleside Recreation Area is located on the northwest side of the refuge and has facilities for crabbing and non-motorized boat launching from April 1 to September 30. Picnic tables and portable restrooms, provided by Kent County, are available for use during these months. Bogles Wharf landing is located on the east side of the refuge and offers trailered boat launching facilities for visitors with a county boat trailer permit. In 2006, approximately 700 visitors used the boat launch. The recently constructed Tundra Swan Boardwalk was designed to run parallel to a deep channel of the Chester River to offer summer fishing and crabbing opportunities, as well as winter wildlife observation.

Additionally, the refuge hosts an annual Youth Fishing Derby each June. A universally-accessible fishing pond located on the gravel road to the Bayview-Butterfly Trail is used for the Derby. The Derby, which has occurred annually on the refuge since 1996, has an average attendance of 41 youth per day. On average, 100 fish are caught each year during the Derby. The refuge awards a variety of prizes to the Derby winners.

Environmental Education
In the past, we have hosted a variety of elementary through college age school and youth groups throughout the year for environmental education programs on the Bay, migratory birds, forested habitats, and other topics as requested.

Each fall and spring, the refuge hosts a comprehensive day of environmental education for all 4th-grade students in Kent County, in cooperation with state and county natural resource agencies. Currently, only teacher and volunteer-led programs are held at the refuge. In 2007, 20 teachers and 200 Kent County 4th graders participated in this on-site education programs.

The National Aquarium in Baltimore was recently awarded a “Nature of Learning” grant to support and enhance the environmental education program on the refuge. Through this grant, the Aquarium has enhanced conservation education efforts on the refuge by conducting environmental education and stewardship activities for students and teachers from Kent County. The proposal is a partnership between the Aquarium, the refuge, the FOEN, and the Kent County School District.

Map 3.8. Eastern Neck Refuge youth turkey hunt program

Chapter 4

John Mosesso, Jr./NBII

Green frog

Management Direction and Implementation

Management Direction and Implementation

Introduction

This chapter is in three parts. In combination, it describes the array of management actions that, in our professional judgment, work best toward achieving the refuge purposes, the vision and goals developed during the planning process, and the goals and objectives of other Service, State, and regional conservation plans. We believe that implementing these actions will also effectively address the key issues raised during plan development.

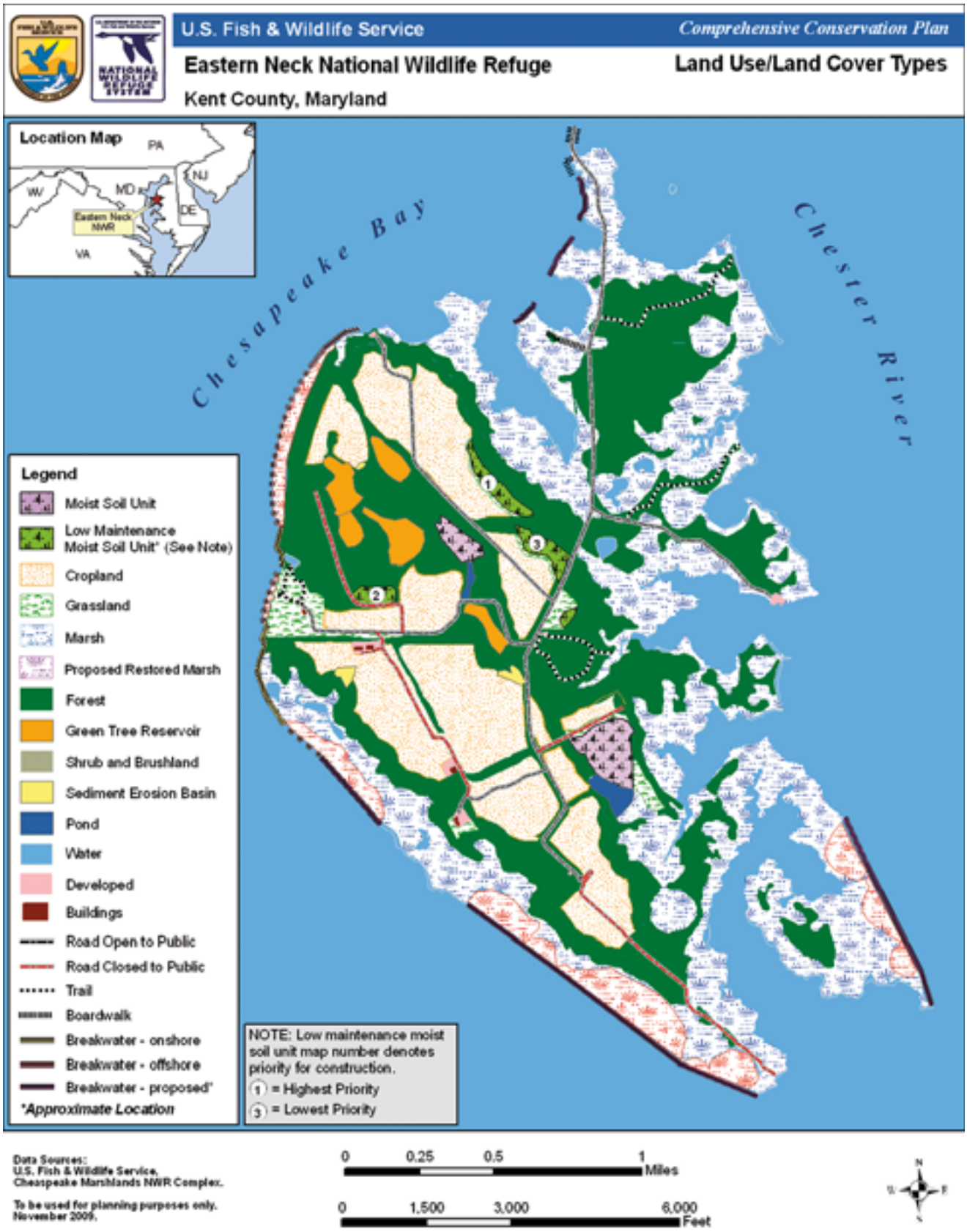
The first part of this chapter, "Summary by Major Program Area", describes the overall intent of our management as it relates to major refuge program areas. The second part, "General Refuge Management," describes specific refuge activities that support multiple goals and objectives. The third part, "Goals, Objectives and Strategies", describes refuge actions that were developed to achieve specific goals and objectives.

Our highest priority in this CCP is the protection and restoration of the refuge's shoreline, and shallow water and tidal marsh habitats. Without addressing the threats to these valuable habitats, the integrity of the entire refuge is compromised. Our next highest priority is to enhance upland habitat for wintering waterfowl and other migratory birds of conservation concern (map 4.1; table 4.1). In addition, we will expand inventorying and monitoring of biological resources to improve our knowledge of, and capabilities for, conserving Service trust species and the habitats on which they depend. We will also focus on improving our existing public use and visitor services programs (see map 4.2). Although we emphasize wildlife observation and photography, we will also continue to provide high-quality hunting, fishing, and environmental education and interpretation programs. All of our programs will continue to benefit from strong partnerships and dedicated volunteers. We will also work to increase the visibility of the Service and the refuge in the local community, and better communicate information about the refuge, its management, and its significance to the regional and local landscape.

Waterfowl on Hail Creek

USFWS

Map 4.1. Projected Habitat Distribution after CCP implementation



Map 4.2. Projected Public Use Infrastructure Under CCP Implementation

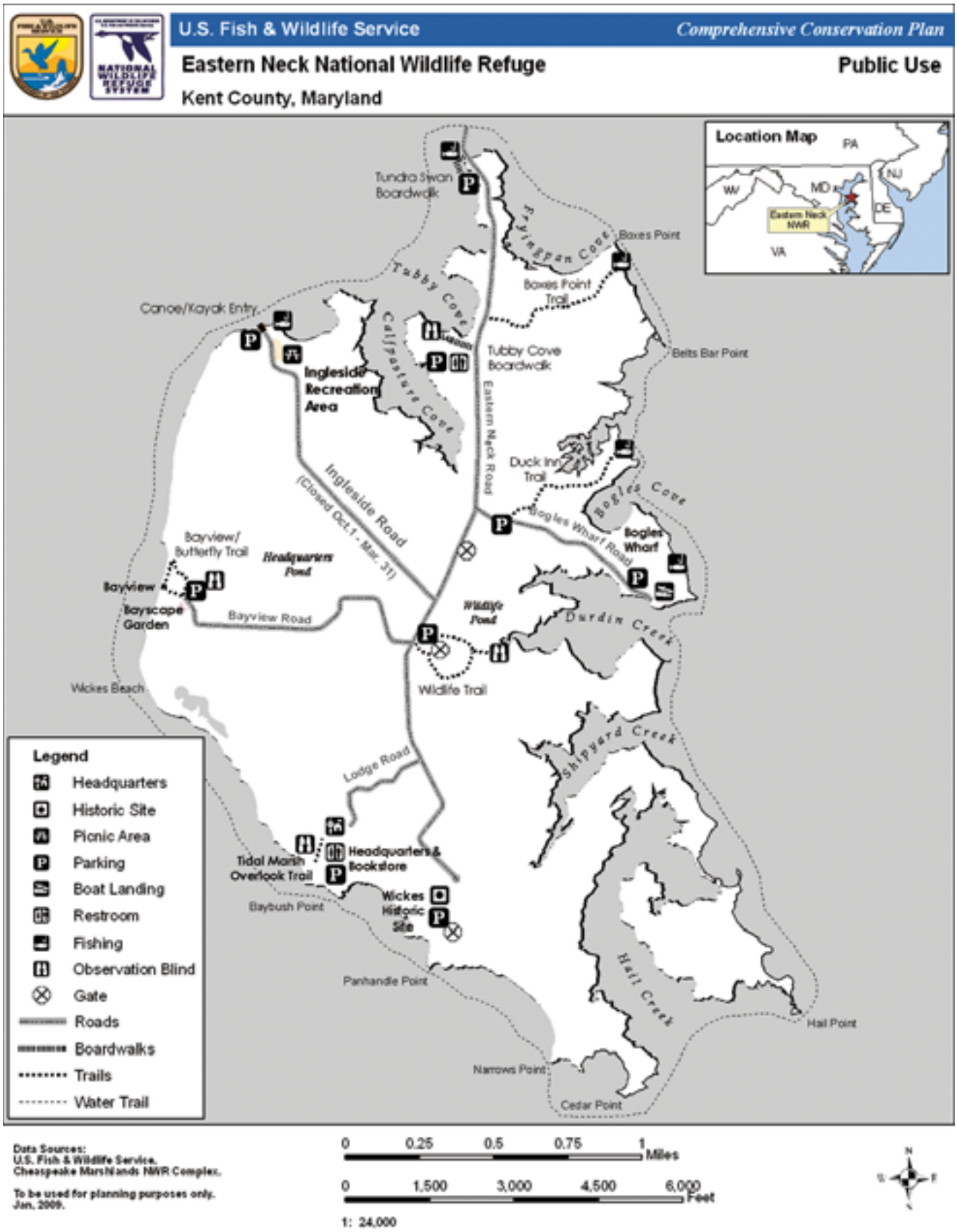


Table 4.1. Projected Habitat/Land Use Acreage after CCP Implementation*

Land Use and Habitat Types	Current	After CCP Implementation
Shrub and Brushland	18.1	**0.0**
Cropland	557.1	**403.4**
Forest**	708.1	**853.4**
Grassland	30.7	**40.3**
Marsh	858.8	**858.8**
Developed	10.5	**10.5**
Managed MSU	28.4	**28.4**
Low Maintenance MSU	1.3	**22.1**
Sediment Erosion Basin	4.2	**4.2**
Pond	8.3	**8.3**
Water	60.5	**60.5**
TOTAL	**2,286.6**	**2,286.6**
Green Tree Reservoirs**	38.0	**38.0**
Proposed Restored Marsh+	0.0	**107.8**

**Acres are approximate based on a combination of GIS-interpreted acres, survey acres. and deed acres*

***Green Tree Reservoirs are managed within the "Forest" land cover type, and therefore, those acres are not additive to the total refuge acres*

+Proposed restored marsh acres are an approximation. Every 5 years we will work with Service surveyors and cartographic experts to determine whether these acres replace eroded or lost acres, or are additive to the total refuge acres.

Summary by Major Program Area

Introduction

This first part of the chapter describes the overall intent of our management as it relates to major refuge program areas. It describes in a general way the management philosophy or framework for developing the more detailed objectives and strategies in this CCP.

Fish, Wildlife and Habitat Management

As noted above, shoreline and shallow water habitat protection and tidal marsh restoration are our highest priorities. Our activities will be accomplished with the continued valuable cooperation of partners and volunteers. Improvements in our cropland and moist soil management programs to benefit wintering and migrating waterfowl is our second highest priority. We will also continue to emphasize controlling invasive plants species with are prevalent on the island and represent one of the biggest threats to biodiversity.

Additionally, we are expanding our inventorying and monitoring to improve our knowledge and capability to conserve Service trust species, other species of conservation concern, and the habitats on which they depend. We are expanding our support of compatible research programs and use of the refuge to demonstrate restoration and adaptive management practices. We look to significant involvement by partners to help us plan and implement those programs.

Public Use

We are improving our existing public use programs, with particular emphasis on wildlife observation and photography, and adding to our infrastructure in the form of new kiosks and signs. We will continue to provide high-quality fishing, hunting, environmental education, and interpretation opportunities in designated areas that are compatible with refuge purposes and the mission of the Refuge System. Some public uses will continue to be seasonally restricted to avoid interfering with important nesting or wintering seasons of species of concern. Some other areas will remain closed year-round where public safety or natural and cultural trust resources are likely to be adversely affected. We are continuing to facilitate refuge volunteer programs and public events, and encourage the use of refuge lands by our partners, assuming those activities promote our goals and the Refuge System mission. Outreach to the communities in our area will be improved in an effort to raise Service visibility and increase the awareness and understanding of the Refuge System mission, in general, and this refuge's purposes, in particular. To a large extent, we look to our volunteers and Friends Group to help implement those outreach events, and to lead interpretive and educational activities.

Refuge Staffing and Administration

It is important to recognize that our proposals in this document do not constitute a commitment for staffing increases, or funding for operations, maintenance, or future land acquisition. Our budgets are determined annually by Congress, and distributed through our Washington and Regional offices, before arriving at field stations. Below we describe activities related to staffing, administration, and operations. Implementing these activities supports all our refuge goals.

Permanent Staffing and Operational Budgets

Our objective is to sustain annual funding and staffing levels that allow us to achieve our refuge purposes, as interpreted by the goals, objectives, and strategies. Many of our most visible projects since refuge establishment were

achieved through special project or "earmarked" funds that typically have a 1- to 2-year duration. While these funds are very important to us, they are limited in their flexibility since they typically cannot be used for any other priority project that may arise.

In response to Refuge System operational funding declines nationwide, a Regional Work Force Plan was developed in 2006 to support a new base budget approach. The goal is to have a maximum of 75% of a refuge complex's budget cover salaries and fixed costs, while the remaining 25% or more will be operations dollars. The intent of this strategy is to improve the refuge manager's capability to do the highest priority project work and not have the vast majority of a refuge's budget tied up in inflexible, fixed costs. Unfortunately, in a stable or declining budget environment, this may also have implications on the level of permanent staffing.

As we discussed in chapter 1, Eastern Neck Refuge is part of the CM Refuge Complex. Resource management, visitor services programs, staffing and budget priorities among the other three refuges will be established each year for the entire Refuge Complex by the Project Leader. As we identify priorities in this document for Eastern Neck Refuge, these will be considered equally in terms of their potential to contribute to the overarching goals established in the 2006 CM Refuge Complex CCP. In the case of Eastern Neck Refuge, this change in organization could potentially increase the amount of resources available for refuge projects, assuming those projects are determined to be a priority for the refuge complex. Unfortunately, the opposite is also true and there may be times when refuge projects are not funded.

The Project Leader has identified five permanent, full-time positions to be assigned to Eastern Neck Refuge. Not all positions are currently filled. While these staff will be assigned to this refuge, they will also occasionally work on other refuges in the Refuge Complex as needed. The five positions are: a wildlife refuge specialist; a biological technician, a maintenance worker, a visitor services specialist; and a law enforcement officer. Other Refuge Complex staff will frequent Eastern Neck Refuge, but will continue to be assigned to the headquarters office.

The additional staffing we propose will provide further depth in implementing our biological and visitor services programs and will enhance our outreach and enforcement capabilities. These positions are identified where they are needed under the respective goal and objectives presented below. A figure representing the staffing chart for the Refuge Complex, including those positions to be assigned to Eastern Neck Refuge are presented in appendix D – Refuge Staffing Chart. We also identify our recommended priority order for new staff positions in appendix C, Refuge Operations Needs (RONS) and Service Asset Maintenance Management System (SAMMS) tables.

Facilities Construction and Maintenance

Over the last seven years, we have made significant progress in rehabilitating the old lodge for use as the refuge headquarters and visitor contact station,

improving our equipment storage and maintenance/shop area, constructing new visitor services facilities, improving access and security, and promoting sustainable energy sources.

We will continue to make incremental progress in constructing new, modest, high-quality visitor services facilities such as interpretive and informational signs and parking areas. We will continue to identify and remove those structures that have no useful purpose or that pose safety hazards. We must also take care to maintain both new and rehabilitated facilities to Service standards to keep them safe, functional, and attractive.

USFWS

Using alternative energy on the refuge

We continue to service, repair, and maintain existing renewable energy infrastructure as needed. In addition, we are evaluating whether to erect new solar panels at the refuge headquarters which has significant electrical usage and public visitation year round. This will depend on funding and whether a suitable site can be located where disturbance is minimal and the panels would be able to work efficiently. In summary, the Project Leader will fully evaluate the alternative energy structures on the refuge and, if necessary, remove them, modify their design, move them to more effective locations and/or add additional infrastructure. The Service remains committed to use of renewable energy sources to the fullest extent feasible on refuge lands.

One of the highest priorities in our maintenance program is to complete the rehabilitation of the lodge. The lodge is eligible for inclusion on the National Register of Historic Places, and most of it was rehabilitated to historic standards over the period 2000–2006. However, there are still a few needs to complete the planned work. Once rehabilitation is complete, maintenance of this facility will remain a priority. This project is identified as a SAMMS project in appendix C.

Refuge Operating Hours

We will maintain the operating hours currently in place for the foreseeable future. The county-owned roads (Eastern Neck Road to the junction with Bogles Wharf Road, and Bogles Wharf Road itself) will remain open 24 hours a day, seven days a week. Adjacent refuge lands designated for public access would generally be open from sunrise to sunset, seven days a week. In 2008, an electronic gate was installed on Eastern Neck Road where a manual gate formerly existed. Access hours are now adjusted electronically according to changes in sunset times and day-light savings. Operating hours are established to insure visitor safety and protect refuge resources. In addition, the Project Leader has the authority to issue a special use permit to allow others access outside these timeframes. For example, research personnel or hunters may be permitted access at different times, or organized groups may be permitted to conduct nocturnal activities, such as wildlife observation, and educational and interpretive programs.

General Refuge Management

Introduction

This second part of the chapter describes actions that were common to all three alternatives evaluated in the draft CCP/EA. These are actions required by law or policy, or represent actions that have undergone a separate NEPA analysis, public review, and/or agency review, and approval. Or, they are administrative actions that do not necessarily require public review, but are actions we wanted to highlight in this plan. Finally, most of the actions outlined in this part of the chapter support multiple goals and objectives, and in order to minimize redundancy, we chose to describe them separately here in more detail rather than list them repeatedly in the third part of this chapter.

Protection of Federal-listed and Recently De-listed Species

We describe the history of the Federal-listed endangered Delmarva fox squirrel on the refuge in chapter 3. This rare squirrel has been present on the refuge since its introduction to the island by hunters in the 1920's (CBFO 2007). Their numbers at Eastern Neck Refuge have declined to the point where there are only one or two sightings per year. This was not entirely unexpected because it is an island population, isolated from any other source populations. For this reason, over the last several years, we have not pursued active management for this squirrel, and together with the recovery team, we have determined that the refuge population is no longer deemed essential to its recovery. However, we will continue to monitor for it, and protect those individuals we locate. Further, if recommended by the recovery team, we would assist in periodic, intensive surveys for the squirrel to confirm population status. Our expectation is that the few remaining individuals will not develop into a viable population over the long-term, and resources that might be focused on improving the refuge for this species would be far more effectively used to address the many other refuge issues. As noted previously, while loss of the population on the refuge may seem dramatic and severe, it is important to recognize that squirrel translocations to other sites in Kent County and elsewhere on the Delmarva Peninsula have been very successful (CBFO 2007) and those populations are expanding (see map 3.5). The species is now on the brink of recovery and all of this past effort has led the way for this response.

The bald eagle was recently removed from the Federal list of threatened and endangered species. However, it continues to be protected under the Bald and Golden Eagle Protection Act, as well as the Migratory Bird Treaty Act. We will continue to protect nesting bald eagles and their habitat on the refuge. There are currently seven nesting pairs and the refuge will continue to monitor the nests and breeding activities and prohibit the public from disturbing them.

Very rare sightings of Federal-listed endangered loggerhead and leatherback sea turtles, and humpback whales have occurred in the Bay. These marine species are under the jurisdiction of National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS).

We have submitted this CCP to the Service's Ecological Services Office – Chesapeake Bay Field Office for intra-agency Endangered Species Act consultation and received their concurrence that the plan complies with that Act. The results of that consultation are included as appendix F, Intra-Service Endangered Species Act (Section 7) Compliance. As future projects are planned and implemented, we will conduct additional consultation with the Service's Ecological Services division and NOAA, as appropriate, regarding threatened and endangered species.

Control of Pest Plants and Animals

The 2007 Integrated Pest Management Plan for the CM Refuge Complex addresses control of native pest plants and animals as well as non-native invasive species. At this time, two waterfowl species are considered pest species and controlled on the refuge: the exotic, invasive mute swan and resident Canada geese.

Mute Swan Management

Despite their aesthetic appeal, mute swans can cause problems. We identify three major plans in chapter 1 specifically responding to the numerous issues and concerns these birds have caused within the Atlantic Flyway, the Chesapeake Bay, and the state of Maryland. The mute swan is native to Europe and Asia, but is an exotic species in the United States. In Maryland, the swan population reached its peak in 1999 with 3,955 birds. Today the population is <1,000 as a result of an integrated population reduction effort by MD DNR and other cooperating agencies whose management goals are to protect critical Chesapeake Bay living resources, particularly submerged aquatic vegetation (Hindman, personal communication 2008). Population growth and range expansion of this species has increased the number of swan-related problems for people and native wildlife.

It is well-documented that mute swans reduce the availability of submerged aquatic vegetation. Concentrations of mute swans have over-grazed submerged aquatic vegetation and other bay grasses to the point that habitat has been eliminated for crabs, fish, and other wetland dependent species (Tatu et al. 2007). This impact has also resulted in reductions of recreational crabbing and fishing opportunities.

In the early 1990s, a large molting flock of mute swans caused a colony of least terns and black skimmers, both state-threatened species, to abandon their nesting site on Barren Island in Dorchester County by trampling nests containing eggs and chicks. This was the only skimmer nesting colony in the Maryland portion of Chesapeake Bay. These swans also displaced nesting Forster's and common terns, declining species in Maryland (CBMSWG 2004). In other areas of the state, mute swans have also been documented killing mallard ducklings and Canada goose goslings.

A major concern is the effect of inter-specific competition between mute and tundra swans. Mute swans have been observed exhibiting aggression toward tundra swans, driving them from protected coves and feeding areas, important habitats for native tundra swans (Caswell et al., 2007). Since the mid-1970s, Maryland's wintering tundra swan population has declined by about 30%. However, research is needed to determine if this decline is related to an increase in competition between native tundra swans and exotic mute swans.

Since the mid-1990s, the MD DNR and some Federal agencies within Maryland have controlled mute swans to prevent their establishment on lands that they manage. Control has included preventing eggs from hatching, live capture and removal of adult swans and humane euthanasia of adult swans. The DNR authorizes landowners to control swans that cause either nuisance or property damage problems. These mute swan control activities have also been combined with efforts to increase public awareness of the problems caused by mute swans. In general, control has been supported by the public. However, animal rights activists object to lethal control methods.

The Service worked with states in the Atlantic Flyway to develop the Atlantic Flyway Mute Swan Management Plan (refer to link *http://www.dnr.state.md.us/wildlife/* to see complete plan). This plan established mute swan population goals for the Atlantic flyway, along with strategies to begin reducing populations to levels within the parameters of the Migratory Bird Treaty Act. The Service also participated in the development of the 2005 Mute Swan Chesapeake Bay Management Plan which establishes goals for managing mute swan within the Bay area. Refuge staffs work closely with MD DNR to implement this plan.

DNR created a Mute Swan Task Force to develop management recommendations. The cornerstone of the task force recommendations was the protection of native species and their habitats from the effects of mute swans. The Task Force recommended and DNR has established "swan-free areas,"

where mute swans are excluded or removed to protect critically important habitats and wildlife resources. Eastern Neck Refuge and the other refuges in the CM Refuge Complex are DNR-designated swan free areas (MD DNR 2003a).

In partnership with DNR, our treatment goal is to prevent competition with native migratory waterfowl. Eradication is the definitive goal; however, this may be unachievable if adjacent landowners are not willing or able to control mute swans. It is important to be vigilant in management efforts and monitor all areas throughout the year.

We will

1) Visually monitor all areas throughout the year, and take appropriate actions to discourage mute swans from becoming established or congregating on the refuge;

2) To the extent possible, eradicate mute swans found on the refuge to reduce competition with native waterfowl. Limit swan reproduction by oiling eggs and removing adult swans. Coordinate control efforts with MD DNR, Virginia Dept of Game and Inland Fisheries, and U.S. Department of Agriculture Animal and Plant Health Inspection Services.

Resident Canada Goose Management

The phrase "resident Canada geese" refers to geese nesting within the conterminous United States during the months of March, April, May, or June, or residing within the conterminous United States during the months of April, May, June, July, or August (USFWS 2005). Historically, Canada geese migrated through Maryland and other states during fall and winter and did not remain year-round. Most of the Canada geese that use the Refuge Complex are migratory Atlantic Population Canada geese. The resident Canada geese do not migrate, but remain year-round, and adversely impact habitats through excessive herbivory which reduces habitat for migrating waterfowl. Resident Canada geese feed on clover, grasses, and cereal grains year long, depleting resources necessary to support migratory Canada geese and other waterfowl.

Our treatment goal is to manage 90 to 100 percent of the resident Canada geese population to reduce competition with migratory waterfowl. We will

1) Visually monitor all areas throughout the year, and take appropriate actions to discourage resident geese from becoming established or congregating on the refuge;

2) Use "scare" tactics to flush geese from croplands and impoundments when preferred vegetation is most vulnerable;

3) To the extent possible, eradicate resident geese found on the refuge to reduce competition with native waterfowl. Use lethal means as necessary to remove adults.

Invasive Plant Management

The establishment and spread of invasive plants is a significant problem that reaches across all habitat types. For the purposes of this discussion, we use the definition of invasive species contained in the Service Manual (620 FW 1.4E): "Invasive species are alien species whose introduction does or is likely to cause economic or environmental harm, or harm to human health. Alien species, or non-indigenous species, are species that are not native to a particular ecosystem. We are prohibited by Executive Order, law, and policy from authorizing, funding, or carrying out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere."

The unchecked spread of invasive plants threatens the biological diversity, integrity and environmental health of all refuge habitats. In many cases, these plants have a competitive advantage over native plants and form dominant cover types, reducing the availability of native plants as food and cover for wildlife. Over the past several decades, government agencies, conservation organizations, and the general public have become more acutely aware of the negative effects of invasive species. There are many plans, strategies, and initiatives targeted toward more effective management of invasive species, including *The National Strategy for Management of Invasive Species* for the National Wildlife Refuge System (2003), *Silent Invasion—A Call to Action* by the National Wildlife Refuge Association (2002), and *Plant Invaders of Mid-Atlantic Natural Areas* by the Service and the National Park Service (2002). New information and updates on recent advances in control techniques are continually provided through the Refuge System biological discussion database and relevant workshops. There are also more funding sources, both within the Service's budget and through competitive grants, to conduct inventories and control programs.

Guidance for managing invasive species on refuges is found in the Service Manual (620 FW 1.7G). These actions, as stated in the Service Manual, serve to define our general strategies on the refuge:

1) Manage invasive species to improve or stabilize biotic communities to minimize unacceptable change to ecosystem structure and function and prevent new and expanded infestations of invasive species;

2) Conduct refuge habitat management activities to prevent, control, or eradicate invasive species using techniques described through an integrated pest management plan, or other similar management plan, which comprehensively evaluates all potential integrated management options, including defining threshold/risk levels that will initiate the implementation of proposed management actions;

3) Evaluate native habitat management activities with respect to their potential to accidentally introduce or increase the spread of invasive species and modify our habitat management operations to prevent increasing invasive species populations;

4) Address the abilities and limitations of potential techniques including chemical, biological, mechanical, and cultural[1] controls and techniques during Refuge Complex integrated pest management planning; and,

5) Manage invasive species on refuges under the guidance of the National Strategy for Invasive Species Management and within the context of applicable policy.

More specific strategies for the refuge include:

6) Continue treatment of the most problematic species as funding and staffing permit;

7) Maintain early-detection/early-response readiness regarding new invasions;

[1] "Cultural control" refers to the deliberate management or modification of the pest plant's environment or habitat through variations of standard horticultural or silvicultural practices. In the refuge's natural habitats, examples of cultural practices include selecting or favoring native plants with appropriate hardiness to outcompete invasive plants, maintaining healthy buffers along forests, streams and shoreline, and minimizing soil and vegetation disturbances that would attract invasive plants. In cropland areas, the use of crop rotation, inter- or mixed-cropping, and managing water and fertilization are examples.

8) Remove parent sources of highly invasive species (species that are high seed producers, or vigorous rhizome producers) from along edges of management units;

9) Maintain accessibility to affected areas for control and monitoring;

10) Continue and increase efforts to involve the community in promoting awareness of invasive species issues, and to seek assistance for control programs on and off the refuge.

In addition to these general strategies, we will refine our control program to address the most critical problems first. Further, our priorities may be adjusted to reflect regional Service priorities, and/or based on new information or resource availability. We will continue to track the spread and control of all invasive plants on the refuge using GIS, GPS, permanent vegetation monitoring plots, and photo points. We will also continue the following efforts to address the four invasive plant species of primary concern here: common reed, also known as *Phragmites*, mile-a-minute, Johnsongrass, and Canada thistle.

In the discussions that follow for each species, we identify potential mechanical, prescribed burning, cultural, chemical, and biological controls or treatments. With regards to chemical controls, we list the current approved herbicides by trade name and primary active agent. It is important to note that not all of these herbicides are used every year in treating invasive plants, and the list of herbicides may change in the future with new information or new approvals for more effective herbicides. All herbicides, including their application rate, are approved by the Regional Contaminants coordinator prior to their use.

Phragmites
Phragmites invades tidal and non-tidal brackish and freshwater marshes, river edges, shores of lakes and ponds, roadsides, and disturbed areas. Once introduced, *Phragmites* spreads quickly and will crowd out native plants, changing marsh hydrology, altering wildlife habitat, and increasing fire potential. It's high above ground biomass blocks light to other plants and occupies much of the growing space belowground. *Phragmites* is also considered a hazardous fuel and easily ignites during arson or wildfire. *Phragmites* has invaded natural wetlands and impoundments throughout all refuges and divisions within the CM Refuge Complex.

We will:

1) Utilize seeded native plants to accelerate establishment of native plant communities and reduce competition from invasive plants

2) Monitor known infestation sites for significant adverse impacts on wildlife habitat.

3) Seed or plant disturbed sites with native species.

4) Control 100% of *Phragmites* where native plants are inhibited or where fire hazards need to be reduced. Control will be applied in any area where water level and wildlife habitat is unacceptable due to *Phragmites* growth. Target control is based on specific situations. However, in cases of severe shoreline erosion, we may make the decision to retain *Phragmites* in certain areas to prevent further erosion until we can establish native vegetation. We provide more information on *Phragmites* control and shoreline erosion under Objective 1.1.1 below.

5) Maintain healthy stands of native perennial plants.

We will continue to use one or more treatment options that include use of herbicides, prescribed burning, and mechanical treatments to provide the best results. Specific strategies follow.

Management	Time of Year	Comments
Hand pull	April–May	When plants are small, make sure to pull roots
Mow	All year	Repeat throughout growing season
Burn	November–March	Do not burn in spring (may stimulate growth)

Chemical: Treat with imazapyr, glyphosate, or similarly effective and approved products, and consider in combination with prescribed burning as developed through a prescribed burn plan. If a population can be controlled soon after it has established, chances of success are much higher because the below-ground rhizome network will not be as extensive. Herbicides are best applied in late summer/early fall either as a cut stump treatment or as a foliar spray. It is often necessary to do repeated treatments for several years to prevent any surviving rhizomes from re-sprouting.

Prescribed burning: Use prescribed fire after the plant has flowered, in combination with herbicide treatment, to reduce standing dead stem and litter biomass. This might help to encourage germination of native plants in the following growing season. Plants should not be burned in the spring or summer before flowering as this may stimulate growth.

Mechanical: Use repeated mowing, which may be effective at slowing the spread of established stands, but is unlikely to kill the plant. This method is most effective when used in combination with herbicide treatments.

We will continue to treat with imazapyr, or similarly effective and approved product, in appropriate locations (where hardwoods are not adjacent to treatment area) in July–September. Glyphosate, or similarly effective and approved products, will be used September–October in areas untreated with imazapyr. Treated areas will be burned from November–March. Priority areas include restoration sites, impoundments, natural wetlands, ditches and any area necessary to reduce hazardous fuels. We will monitor using visual inspection, GPS, and permanent photo points.

Herbicide*	Time of Year	Treatment	Comments
Glyphosate	September–October	Foliar application, cut stump treatment	Apply when flowering
Habitat (imazapyr)	July – October	Foliar application, cut stump treatment	Apply during active growing season, do not apply near hardwoods (can mix with glyphosate)
* Specific herbicides are listed which are used presently, but any similarly effective and approved products may be used in the future.			

Mile-a-Minute
The mile-a-minute weed is an herbaceous, annual, trailing vine that is widely distributed throughout the refuge, and is a high priority for management. Mile-

a-minute weed generally colonizes open and disturbed areas, along the edges of woods, wetlands, stream banks, roadsides, and uncultivated open fields, resulting from both natural and human causes. It will tolerate shade for a part of the day, but needs a good percentage (63-100%) of the available light. The ability of mile-a-minute to attach to other plants with its recurved barbs and climb over the plants to reach an area of high light intensity is a key to its survival. This invasive spreads rapidly and is difficult to manage once established.

Our treatment goal is to prevent competition with newly seeded native plants in habitat restoration sites, future restoration areas, and native wildlife habitat. We will pursue the following objectives:

1) Monitor known infestation sites, newly seeded areas, roadways, sites of previous human occupation, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

2) Seed disturbed sites with native species.

3) Control 100% of mile-a-minute to reduce competition with native plants and maintain native wildlife habitat.

4) Keep records of treated areas in GIS.

5) Maintain healthy stands of native perennial plants.

6) Monitor treatments using visual, GPS and permanent photo points.

We will continue to use one or more treatment options that include mechanical, cultural, and biological treatments, and the use of herbicides to provide the best results.

Management	Time of Year	Comments
Pull	April – October	Repeatedly pull plants when young
Mow/Cut	April – July	Mow before plants go to seed

Specific strategies follow.

Mechanical: Hand-pull seedlings throughout the summer. The site must be rechecked at frequent intervals, and removal of new plants continued until the seed germination period is complete, roughly early April until early July. Repeated mowing or trimming of mile-a-minute plants will prevent the plants from flowering and thus reduce or eliminate fruit and seed production.

Cultural: Employ cultural methods to discourage the introduction of mile-a-minute to an area. It is important to maintain vegetative community stability and to avoid creating gaps or openings in existing vegetation. Maintaining broad vegetative buffers along streams and forest edges will help to shade out and prevent establishment of mile-a-minute weed. This will also help to reduce the dispersal of fruits by water.

Chemical: Various herbicides can be used to treat mile-a-minute (see table to right). The chosen herbicide may depend on funding, and other invasive target species and non-target species in the vicinity of the management area. Dead plants may be burned or mowed. In 2006, we chemically treated mile-a-minute with Journey from June–August and with a mix of Garlon 3A, Escort, and glyphosate in July.

Herbicide*	Time of Year	Treatment	Comments
Plateau (imazapic)	April - October	Foliar	Target early growing season. Repeat application throughout the season.
Plateau / Glyphosate			
Overdrive (sodium salt of diflufenzopyr)			
Journey (imazapic/ glyphosate)			
Garlon 3A (triclopry) / Escort (metsulfuron methyl)/ Glyphosate	June - August	Foliar	Target early growing season. Repeat application throughout the season.
* Specific herbicides are listed which are used presently, but any similarly effective and approved products may be used in the future.			

Biological: Use an Asian weevil, *Rhinoncomimus latipes* (R. latipes), as a biological control for mile-a-minute as long as research and field trials determines it is still a viable option. Adult R. latipes are about 2mm long, and are black, but may be covered by an orange film derived from plant exudates once they start feeding. They eat small holes in young leaves of mile-a-minute and lay their eggs on leaves and stems. After hatching, larvae bore into the stem where they complete development, then exit the stem and drop to the soil for pupation. Weevils are very small, but can be observed directly in the field, especially at the ends of terminals. Additional information on this weevil can be obtained from a Final EA titled, "Field Release of *Rhinoncomimus latipes* (Coleoptera: Curculionidae), a Weevil for Biological Control of Mile-a-Minute Weed (*Polygonum perfoliatum*) in the Continental United States" was published in July 2004 by USDA, Marketing and Regulatory Programs, Animal and Plant Health Inspection Service (APHIS).

Johnsongrass

Johnsongrass is a 3 to 10 ft tall erect, perennial grass that produces seed the first year. Seedlings develop rhizomes three to four weeks after emergence (McWhorter 1981). Johnsongrass is a serious weed pest in all annual agricultural crops, grasslands, ditches, and roadsides. It grows in a variety of soils, and it thrives in fertile lowlands. Lands infested with Johnsongrass can produce seven tons of rhizomes per acre, and ten bushels of seed per acre (McWhorter 1981). Johnson grass is declared a "noxious weed" throughout the U.S. and management of this species is required by state law. It is found on croplands and grasslands on the refuge and its control is a high management priority. We will control Johnsongrass wherever it occurs on the refuge to comply with state law and to prevent competition with newly seeded native plants in habitat restoration sites, future restoration areas, and native wildlife habitat.

To accomplish this, we will:

1) Monitor all potential habitats for the presence of Johnsongrass during routine mowing, maintenance and vegetation monitoring activities.

2) Treat 100% of Johnsongrass - targeting for elimination - to reduce competition with native plants germinating in the spring. Reseed control areas with native species where cover is needed.

3) Maintain healthy stands of native perennial plants by mowing, scything, herbicide treatment, or fire.

We will continue to use one or more treatment options, including primarily mechanical treatments and use of herbicides, but also cultural treatments, to provide the best results. Specific strategies follow.

Mechanical: Mow repeatedly, and pull seedlings from May through June.

Chemical: Use herbicides to control the upper plant, but recognize these chemicals do not always translocate to the dormant buds found on the rhizomes, and these buds remain viable and later germinate. Pre-emergent treatment will control seedlings, but not established stands. Various herbicides can be used to manage Johnsongrass (see the table below). The chosen herbicide will depend on funding, and other invasive target species and non-target species in the vicinity of the management area.

Herbicide *	Time of Year	Treatment
Glyphosate / Arsenal (imazapyr)	May - July	Foliar
Plateau (imazapic)		
Accent (nicosulfuron)		
* Specific herbicides are listed which are used presently, but any similarly effective and approved products may be used in the future.		

Cultural: Use cultural control methods in established stands of Johnsongrass where rhizome development can be controlled. Rhizome production is reduced if plants are kept shorter than 12 to 15 inches. Well managed crop rotation provides competition, and it slows the development of rhizomes. If cultivation is not repeated, the infestation can spread, since broken rhizome segments can produce roots and shoots. Fields cultivated every four to five weeks offer the best results, and the recommendation is to use several tools - one to cut the rhizomes into small sections, and another to bring the fragments to the soil surface.

Canada Thistle
Canada thistle is an herbaceous perennial with erect stems 1½ to 4 feet tall, prickly leaves and an extensive creeping rootstock. It produces an abundance of bristly-plumed seeds which are easily dispersed by the wind. Canada thistle grows in barrens, glades, meadows, prairies, fields, pastures, and along roadsides. It does best in disturbed upland areas, but also invades wet areas with fluctuating water levels.

Canada thistle is found in grasslands, croplands, dike and road edges on the refuge. It is declared a “noxious weed” throughout the U.S. and management of this species is required by state law. We will eliminate Canada thistle where it occurs on the refuge to comply with state law and to prevent competition with newly seeded native plants in habitat restoration sites, future restoration areas, and native wildlife habitat. To accomplish this, we will:

1) Monitor all potential habitats for the presence of Canada thistle during routine mowing, maintenance and vegetation monitoring activities.

2) Treat 100% of Canada thistle plants - targeting for elimination - to reduce competition with native plants germinating in the spring. Reseed control areas with native species where cover is needed.

3) Maintain healthy stands of native perennial plants by mowing, scything, herbicide treatment, or fire.

We will use a combination of mechanical and chemical weed management options for the best results. Specific strategies follow.

Mechanical: Hand-cut individual plants, or mow larger infestations prior to seed set. If the plants begin to set seed, seed heads are cut and bagged. This must be repeated until the starch reserves in the roots are exhausted. Canada thistle can also be managed through controlled burns late in the growing season. Early season burning of Canada thistle can stimulate its growth and flowering.

Chemical: Repeated applications are necessary due to the long life of seeds stored in the soil. Various herbicides can be used to manage Canada thistle (see the table above). The chosen herbicide will depend on funding, and other invasive target species and non-target species in the vicinity of the management area.

Herbicide*	Time of Year	Treatment
Overdrive (sodium salt of diflufenzopyr)	Bud stage (May – June)	Foliar application
Transline (clopyralid)		Foliar application
Garlon (triclopyr)/ Glyphosate		Foliar application
2-4-D (dichlorophenoxyacetic acid)		Foliar application
Milestone (aminopyralid) and/or Escort (metsulfuron methyl)	Mayy – June	Foliar application
* Specific herbicides are listed which are used presently, but any similarly effective and approved products may be used in the future.		

Light Goose Monitoring

While not currently an issue on the refuge, we are aware of concerns by Service and state waterfowl experts that greater and lesser snow geese and Ross's geese (collectively referred to as "Light Geese") may be changing their migrating and wintering habits in the Atlantic flyway, and their use may dramatically increase on protected areas such as the refuge over the next 15 years. With completion of an environmental impact statement, the Atlantic Flyway Council and individual states have implemented a Light Goose Conservation Order. The principal action to be taken in the state of Maryland is an extended hunting season on light geese (lesser snow and Ross' goose, combined). This could result in a shift in use by geese in the region, and concentrating their use on the refuge, which does not have a waterfowl hunting season and provides desirable forage in its cropland management program. We will monitor for increased use by light geese in conjunction with our other waterfowl surveys. Monitoring results will be shared with MD DNR, other refuges in the region to ascertain whether a pattern is developing. Should light goose numbers increase to the point that AP Canada geese and other waterfowl focal species are, or may be, adversely impacted, we will consider modifying our management to discourage use. Actions that may be considered include a reduction in cropland management, select control of light geese which may include using non-lethal scare tactics, lethal control, or any other proposals to discourage light goose recommended by Service and state waterfowl experts.

Monitoring and Abatement of Wildlife Diseases

The Service Manual chapter on Disease Prevention and Control is not yet published. Until it is, we derive guidance on this topic from the Refuge Manual and specific directives from the Director of the Fish and Wildlife Service or the

Secretary of the Interior. Refuge Manual 7-RM-17.3 lists three objectives for disease prevention and control:

1) To manage wildlife populations and habitats so the likelihood of disease contraction and contagion are minimized;

2) To provide for early detection and identification of disease mortality when it occurs; and

3) To minimize losses of wildlife from disease outbreaks.

These objectives were published in 1982. Since that time, in addition to diseases that cause serious mortality among wildlife, more attention has been given to those diseases that are transmitted through wildlife to humans. One example is Lyme disease. In 2002, a Service Manual chapter on Lyme Disease Prevention was published (242 FW 5) to make employees, volunteers and national service workers on refuges aware of this disease and how to prevent it and treat it.

Avian influenza is also receiving considerable worldwide attention. Of particular concern is the highly pathogenic Eurasian form (H5N1). In 2006, all refuges were instructed to prepare an Avian Influenza Surveillance and Contingency Plan. The plan covering refuges in the CM Refuge Complex was approved July 2007 (USFWS 2007e) and discusses methods for dealing with this disease.

Chronic Wasting Disease (CWD) is a fatal disease that attacks the brain and spinal cord of deer and elk. While the exact cause is unknown, it is believed to be caused by a prion—an altered protein that causes other normal proteins to change and cause sponge-like holes in the brain. CWD was first identified in the 1960s in a Colorado research facility and since that time it has been found in Wisconsin, Wyoming, Nebraska, New Mexico, South Dakota, Illinois, Utah, Kansas, Minnesota, Montana, Oklahoma, New York, West Virginia and Canada. CWD has not been found in white-tailed deer in Maryland. Prion diseases, like CWD, do not move easily between species. There is no scientific evidence that CWD has been transmitted to animals other than deer, elk, and moose.

The MD DNR has conducted targeted surveillance for CWD since 1999 and began active surveillance in 2002. Each year a sample of hunter harvested deer are examined with brain and lymph node samples taken. The Maryland Department of Agriculture (MDA), Maryland Department of Health & Mental Hygiene (DHMH) and the U. S. Department of Agriculture (USDA) are integral partners in all CWD surveillance plans to assist in monitoring wild deer populations, and protect domestic animals and health. The State reported that, as of June of 2007, CWD was not present in Maryland deer. The Service, and nine other Federal agencies, developed a comprehensive plan to assist the states in management of the disease in free-ranging deer and elk. This plan includes disease surveillance, control, and diagnosis, as well as information and education outreach. A draft Northeast regional plan to address CWD in the region and a clear plan of how to complete the draft were outcomes of the meeting. Site specific plans will be stepped down from the regional plan. A CWD management plan for the CM Refuge Complex was approved in 2007.

Forest Health Management

In addition to wildlife diseases, we will be attentive to diseases and insect pests that affect forest health. Since we place high value on oak hardwood forests on the refuge, diseases and insects that affect oaks are of special concern. Oaks in the U.S. are affected by more than 80 documented insects and diseases, with escalating international trade likely to introduce new pests. Impacts of these pests range from minor defoliation to rapid mortality. In some years, pests cause

the loss of a major portion of the acorn crop, impeding oak regeneration. A few pests have altered, or may alter, eastern U.S. oak forests on a broad scale. For example, the spread of the introduced gypsy moth, a defoliator, has been aided in the last few decades by the accidental transport of egg masses by humans. In 2007, the U. S. Forest Service (USFS) conducted an aerial survey to look for gypsy moth damage on the refuge, but none was found; however, we will remain vigilant in looking for it and treat commensurately, after receiving necessary approvals, with the risk. Previous to the 2007 survey, the most recent forest health report was conducted in 1983 in conjunction with developing a forest management plan.

General strategies for disease prevention and control include:

1) Continue to conduct disease and pest surveillance in conjunction with other field work;

2) Cooperate with Federal and state agencies, particularly MD DNR, and USFS in conducting surveillance, providing access for sampling, and following protocols in the event of an outbreak;

3) Establish a systematic program to monitor forests and other habitats for indicators of increased occurrence of pests or disease. For example, note changes in flowering or fruiting phenology, physical damage, decay, weakening, sudden death, particularly of canopy and source trees of major host species, and note changes in wildlife use of habitats such as the absence of breeding birds that used to be seen regularly;

4) Conduct assessments as a priority after severe events occur (e.g. wind, drought, ice, fire) or any other event resulting in significant tree loss or blowdown. Consider appropriate stand treatments to reduce risk from pests and pathogens; and,

5) Follow protocols outlined in national, state, and refuge-specific disease prevention and control plans.

Biological and Ecological Research and Investigations

Guidance on conducting and facilitating biological and ecological research and investigations on refuges is found in the Refuge Manual and the Service Manual. In 1982, the Service published three objectives for supporting research on units of the Refuge System in the Refuge Manual (4 RM 6.2):

1) To promote new information and improve the basis for, and quality of, refuge and other Service management decisions;

2) To expand the body of scientific knowledge about fish and wildlife, their habitats, the use of these resources, appropriate resource management, and the environment in general; and

3) To provide the opportunity for students and others to learn the principles of field research.

In 2006, the Service Manual (603 FW 1.10D(4)) provided supplemental guidance in terms of the appropriateness of research on refuges, as follows: “We actively encourage cooperative natural and cultural research activities that address our management needs. We also encourage research related to the management of priority general public uses. Such research activities are generally appropriate. However, we must review all research activities to decide if they are appropriate

or not as defined in section 1.11. Research that directly benefits refuge management has priority over other research."

All research conducted on the refuge by others must be determined in writing to be both appropriate and compatible. As noted in chapter 3, "Existing Environment," we have found several research projects to be appropriate and compatible. We expect that additional opportunities to conduct research on the refuge will arise in the future. In making determinations on the appropriateness and compatibility of future research proposals, we will follow guidance in the Refuge and Service Manuals, and will employ the following general strategies:

1) Seek qualified researchers and funding to help answer refuge-specific management questions;

2) Participate in appropriate multi-refuge studies conducted in partnership with the U.S. Geological Survey;

3) Facilitate appropriate and compatible research by providing temporary housing and equipment, if available, for persons conducting field work; and,

4) Pursue peer-reviewed publications of research, and/or insure the Service is acknowledged as a contributor in research conducted on the refuge by others.

Developing Refuge Step-down Plans

Service planning policy identifies 25 step-down plans that may be applicable on any given refuge. We have identified the 10 plans below as the most relevant to this planning process, and we have prioritized their completion if they are not already developed for the CM Refuge Complex. Sections of the refuge Habitat Management Plan (HMP) which require public review are presented within this document and will be incorporated into the final version of the HMP within three years of CCP approval. We will also develop an Annual Habitat Work Plan (AHWP) and an Inventory and Monitoring Plan (IMP) as high priority step-down plans. These are described in more detail below. They will be modified and updated as new information is obtained so we can continue to keep them relevant. Completion of these plans supports all refuge goals.

The Integrated Pest Management, Chronic Wasting Disease and the Avian Influenza plans have recently been completed for the Refuge Complex which incorporates Eastern Neck Refuge. They are adopted as part of this CCP. In addition, each of the following plans will be completed for the entire CM Refuge Complex according the following schedule; with details on Eastern Neck Refuge incorporated therein:

- A Law Enforcement Plan; within 3 years of CCP approval

- Safety Plan; within 3 years of CCP approval

The following plans will be specific Eastern Neck Refuge plans and completed separately from the Refuge Complex plans.

- Fire Management Plan; within 3 years of CCP approval (see also appendix E–Fire Management Program Guidance)

- A Visitor Services Plan, within 3 years of CCP approval, and would incorporate previously approved hunting plans

- A HMP, within three years of CCP approval (see discussion immediately below, and discussion on NEPA requirements)
- An AHWP, annually and consistent with CCP approval (see discussion below)
- An IMP, within 5 years of CCP approval (see discussion below)

Habitat Management Plan
A Habitat Management Plan (HMP) is the requisite first step to achieving goals 1 and 2 and is the highest priority step-down plan to complete. The HMP will incorporate the CCP habitat objectives and will also identify "what, which, how, and when" actions and strategies will be implemented over the 15-year time frame to achieve those objectives. Specifically, the HMP will define management areas, treatment units, identify type or method of treatment, establish the timing for management actions, and define how we will measure success over the next 15 years. In this CCP, the goals, objectives, and list of strategies under each objective identify how we intend to manage habitats on the refuge. Both the CCP and HMP are based on current resource information, published research, and our own field experiences. Our methods, timing, and techniques will be updated as new, credible information becomes available. To facilitate our management, we will regularly maintain our GIS database, documenting any major vegetation changes on at least a 5 year basis. As appropriate, actions listed in "General Refuge Management" will be incorporated into the HMP.

Annual Habitat Work Plan and Inventory and Monitoring Plan
The AHWP and IMP are also priorities for completion with CCP approval. They support the HMP's objectives by detailing annual activities and measuring our successes. The AHWP is generated each year from the HMP, and outlines specific management activities to occur in that year. The IMP will outline the methodology to assess whether our original assumptions and proposed management actions are, in fact, supporting our habitat and species objectives. Inventory and monitoring needs will be prioritized in the IMP. The results of inventories and monitoring will provide us with more information on the status of our natural resources and allow us to make more informed management decisions. Further, our ability to implement an adaptive management approach depends in large part on developing a monitoring program that allows us to learn about the impacts of our management actions, and then use those results to update knowledge and adjust management actions.

Wildlife-Dependent Recreational Programs

Jonathan Priday/USFWS

A young visitor admiring the office renovation

The 1997 Refuge Improvement Act designated six wildlife-dependent priority public uses on National Wildlife Refuges: hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation. Per the General Guidelines for Wildlife-Dependent Recreation, Fish and Wildlife Service Manual, 605FW 1, we will strive to ensure that the wildlife-dependent recreation program:

1) Promotes safety of participants, other visitors, and facilities
2) Promotes compliance with applicable laws and regulations and responsible behavior
3) Minimizes or eliminates conflict with fish and wildlife population or habitat goals or objectives in an approved plan
4) Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation

5) Minimizes conflicts with neighboring landowners

6) Promotes accessibility and availability to a broad spectrum of the American people

7) Promotes resource stewardship and conservation

8) Promotes public understanding and increases public appreciation of America's natural resources and our role in managing and conserving these resources

9) Provides reliable/reasonable opportunities to experience wildlife

10) Uses facilities that are accessible to people and blend into the natural setting

11) Uses visitor satisfaction to help to define and evaluate programs

In 2006, the Northeast Regional Visitor Services Review Team identified visitor programs of emphasis for each refuge. The two programs identified for this refuge are: wildlife observation and wildlife photography. This determination was based on careful consideration of the refuge's natural resources, predicted staff and operational funds, existing and potential facilities, and which programs we would be most effective in providing "quality" opportunities for visitors. While all of the priority public uses are important and offered to some degree on this refuge, wildlife observation and photography will receive greater emphasis when prioritizing refuge resources. As always, we look to our partners, Friends Group, and/or other volunteers to develop and assist with all refuge public use programs.

Appropriateness and Compatibility Determinations

Chapter 1 describes the requirements for appropriateness and compatibility determinations. Appendix B includes all the approved findings of appropriateness and compatibility determinations supporting the activities outlined in this CCP. We only allow activities determined appropriate and compatible to meet or facilitate refuge purposes, goals, and objectives.

Activities Not Allowed
We have received requests for non-priority, non-wildlife dependent activities that have never been allowed on this refuge. Activities evaluated by the refuge manager and determined not to be appropriate on refuge lands include: horseback riding, swimming, sunbathing, competitions or organized competitive group events (e.g. fishing tournaments, or dog trials), large group non-wildlife-dependent gatherings (e.g. weddings, family reunions, and other similar parties), berry picking, and geo-caching. Appendix B documents the refuge manager's decision on their appropriateness. Most of these activities are sufficiently provided elsewhere nearby on other ownerships, so the lack of access on the refuge does not eliminate the opportunity in the area. According to Service policy 603 FW 1, if the refuge manager determines a use is not appropriate, it can be denied without determining compatibility.

Non-Priority Activities Allowed
In addition to the six priority recreational and educational uses, we have determined that several other activities are appropriate and compatible on refuge lands under certain circumstances. They are research, cooperative farming, and the operation of the Ingleside Recreation Area by Kent County. Details on these activities can be found in appendix B.

Special Use Permits
Special Use Permits may be issued for specialized or unique activities allowed on National Wildlife Refuges. Each activity will be evaluated on a case by case basis to determine appropriateness and compatibility.

Distributing Refuge Revenue Sharing Payments

As we describe in chapter 3, we pay Kent County refuge revenue sharing payments based on the total acreage and the appraised value of refuge lands. These annual payments are calculated by formula determined by, and with funds appropriated by, Congress. We will continue those payments in accordance with the law, commensurate with changes in the appraised market value of refuge lands, or new appropriation levels dictated by Congress.

Protecting Cultural Resources

As a Federal land management agency, we are entrusted with the responsibility to locate and protect all historic resources, specifically archeological sites and historic structures eligible for, or listed in, the National Register of Historic Places. This applies not only to refuge lands, but also on lands affected by refuge activities, and includes any museum properties. As described in chapter 3, consultation with the Maryland SHPO indicates there are numerous recorded archeological sites within the refuge area. Considering the refuge's location on the Bay at the mouth of the Chester River with its outstanding fishing, shell-fishing and hunting opportunities, it is likely that additional prehistoric or historic sites may be located in the future. There is also the historic lodge (currently managed as refuge headquarters and Visitor Contact Station) which is eligible for listing on the National Register.

We will conduct an evaluation of the potential for our projects to impact archeological and historical resources, and will consult with the SHPO. This will be especially important for those projects that include moving or displacing soil. A pre-project evaluation of activities will ensure we comply with section 106 of the National Historic Preservation Act. That compliance may require any or all of the following: a State Historic Preservation Records survey, literature review, or field survey. We submitted this CCP for review to the SHPO. The results of that review are included in appendix G.

We will also continue to rehabilitate the lodge, which serves as both our headquarters and Visitor Contact Station, as described below in the section on "Facilities, Construction, and Maintenance." Enforcement against vandalism and looting will also continue. We will also continue to work with state and local historic societies and preservation offices to interpret cultural resources on the refuge, including the exhibits in the Visitor Contact Station and the Wickes' historical marker, and to explain the importance of protection and preservation of those resources.

Adaptive Management

We will employ an adaptive management approach for improving resource management by learning from management outcomes. In 2007, then Secretary of Interior Kempthorne issued Secretarial Order No. 3270 to provide guidance on policy and procedures for implementing adaptive management in departmental agencies. In response to that order, an intradepartmental working group developed a technical guidebook to assist managers and practitioners: "Adaptive Management: The U.S. Department of Interior, Technical Guide." It defines adaptive management, the conditions under which we should consider it, the process for implementing it in a structured framework, and evaluating its effectiveness (Williams et al., 2007). You may view the technical guidebook at http://www.doi.gov/initiatives/AdaptiveManagement/documents.html.

The guidebook provides the following operational definition for adaptive management:

> *"Adaptive management is a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social and economic goals, increase scientific knowledge, and reduces tensions among stakeholders."*

This definition gives special emphasis to the uncertainty about management impacts, iterative learning to reduce uncertainty, and improved management as a result of learning. At the refuge level, monitoring management actions and outcomes, and key resources, will be very important to implementing an adaptive management process. Our grassland, invasive species, and integrated pest management activities are examples of refuge programs or activities where an adaptive management approach may be implemented.

Control of mile-a-minute on the refuge

USFWS

The refuge manager will be responsible for changing management actions and strategies if they do not produce the desired conditions. Significant changes from what we present in this CCP may warrant additional NEPA analysis and public comment. Minor changes will not, but we will document them in our project evaluation or annual reports. Implementing an adaptive management approach supports all refuge goals.

Additional NEPA Analysis

For all major Federal actions, NEPA requires the site-specific analysis and disclosure of their impacts, either in an environmental assessment (EA) or in an EIS. Most of the actions outlined here and fully analyzed in the draft CCP/EA were described in enough detail to comply with NEPA, and will not require additional environmental analysis. Although this is not an all-inclusive list, the following projects fall into this category: the HMP, including its cropland, grassland, and wetlands habitat management programs; biological inventories and monitoring; modifications to our public use programs, new visitor services infrastructure planned; and controlling invasive plants and animal pests.

The new shoreline protection or breakwater projects are examples of a major action we feel did not have a thorough enough analysis in the draft CCP/EA to comply with NEPA. As a result, additional analysis and public involvement will be necessary once a lead agency and site-specific proposals are developed. In addition, we will adhere to all federal and state requirements for obtaining authorizations or permits and for protecting jurisdictional wetlands required for national wildlife refuges.

Refuge Goals, Objectives, and Strategies

Introduction

This third part of the chapter describes the relationship between goals, objectives, and strategies and details the actions we plan to implement to achieve specific objectives. Each goal and objective includes a rationale to explain why we think it is important. Strategies listed under each objective identify specific actions to implement for meeting that objective and indicate when those actions will be undertaken.

Relating Goals, Objectives, and Strategies

One of the earliest steps in developing this plan was to formulate refuge goals and subgoals: the intentionally broad, descriptive statements of the desired future condition of refuge resources. Goals and subgoals articulate the principal elements of refuge purposes and the vision statement, and provide a foundation for developing specific management objectives and strategies. By design, goals and subgoals are less quantitative and more prescriptive than their objectives in defining the targets of our management. Under each respective goal and subgoal we provide a rationale to clarify the conditions we are striving towards.

Our next step was to develop management objectives to help us meet those goals. Objectives are incremental steps toward achieving a goal; they also further define the management targets in measurable terms. They provide the basis for determining more detailed strategies, monitoring refuge accomplishments, and evaluating our success. "Writing Refuge Management Goals and Objectives: A Handbook" (USFWS 2004b) recommends that objectives possess five properties to be "SMART": (S) specific, (M) measurable, (A) achievable, (R) results-oriented, and (T) time-fixed.

A rationale accompanies each objective to explain its context and why we think it is important. This will help us determine how to measure our success in achieving each objective.

For each objective, we developed strategies: the combination of specific actions, tools, or techniques we may use to achieve that objective. Subsequent refuge step-down plans will help us further evaluate how, when, and where we should implement most of the strategies.

GOAL 1

Protect and enhance Service trust resources, and species and habitats of special concern in the Chesapeake Bay region.

Rationale for goal:
Our highest priority over the next 15 years is to protect against additional refuge shoreline erosion and the loss of refuge tidal marsh. Shoreline and tidal marsh habitats are threatened by erosive forces and invasive species; nearby shallow waters and submerged aquatic vegetation (SAV) beds also face these threats and the impact of pollutants. The integrity of the refuge, and its ability to support both aquatic and terrestrial Federal trust species and habitats, depends on stemming shoreline, tidal marsh and SAV bed losses. The protection and monitoring of species that rely on these habitat areas, such as inter-jurisdictional fish, shellfish, and other aquatic species on the refuge, is an important part of this goal.

These habitat areas and others on the island also sustain nesting bald eagles, and a wide diversity of other migratory songbirds and waterfowl. Managing refuge habitats, as part of a regional partnership to sustain wintering populations of migratory waterfowl and contribute to North American Waterfowl Management

Plan population goals is another important aspect of this goal. The Upper Eastern Shore of the Bay has historically sustained the greatest concentrations of Atlantic Population (AP) Canada geese and other wintering waterfowl in the Atlantic Flyway. Wintering birds are attracted to the Chester River basin because of its extensive areas of brackish tidal marsh, open shallow water, and SAV beds. Eastern Neck Refuge, which is uniquely located in the lower Chester River basin and the only protected Federal land on the Upper Eastern Shore of the Bay, provides sanctuary, shelter from severe weather, and food to sustain these wintering waterfowl and other migratory birds. The rare tundra swan also winters in the shallow waters near the refuge.

Other Federal trust resources covered by this goal are the many archeological and cultural resources on refuge lands. The refuge's long history of pre-colonial and colonial uses has resulted in structures and sites eligible for the National Historic Register.

SUBGOAL 1: Maintain and restore the integrity of the refuge shoreline and nearshore environments to sustain Service trust resources and diverse natural communities.

Rationale for subgoal:
Sustaining a diversity of refuge habitats to support Service trust resources and other species of conservation concern depends on maintaining the integrity of the shoreline along Eastern Neck Island over the long term. Eastern Neck Island and its near-shore tidal wetland and shallow water environments are continually subject to the natural erosive forces of the Bay and Chester River, forces exacerbated by boat traffic, major storms, and sea level rise. Water pollutants from the greater Bay and Chester River watersheds threaten submerged aquatic vegetation (SAV) beds and other aquatic resources in general. The long-term success of our management efforts to sustain the trust species and diverse natural communities on the refuge depends upon actions we must make to maintain the integrity of these shoreline and near-shore environments. Actions to protect those areas on and near the refuge, in particular the eroding shoreline and tidal marshes, are the highest priority to implement on the refuge. Our strategies under objective 1.1.1 and objective 1.1.2 were developed with that priority in mind.

Objective 1.1.1 (Shoreline Protection):

Over the next 15 years, continue to protect approximately 8,700 feet total of western refuge shoreline from erosion by maintaining the existing offshore breakwaters (approximately 6,066 linear feet) and on-shore armoring (approximately 2,627 linear feet). In addition, protect approximately 28,000 feet total of southern, southwestern, and northern refuge shoreline from erosion by developing new shoreline protection projects.

Basis for the Objective:
The refuge has a history of severe shoreline erosion—between 1867 and 2005, the Island lost 291 acres of land to the Bay (Cronin 2005). In the late 1980s, the refuge's western shoreline retreated by as much as 10 feet per year. Unlike barrier islands along the coast that lose shoreline on one end but gain land on the other, when Chesapeake Bay islands erode, the material is lost to the Bay forever resulting in a direct, permanent loss of valuable wildlife habitat.

Refuge guts and creeks support and protect SAV beds critical to waterfowl, fisheries and other aquatic resources. The stability and integrity of the refuge shoreline is critical to maintaining the richness of these shallow water habitats.

In 1991, a project was implemented to construct erosion control structures consisting of five stone breakwaters (constructed of 1.5- to 3-ton[2] stones) along the refuge's western shore. The purpose of the breakwaters is to "break" or absorb wave energy before it reaches the beach. Offshore breakwaters of a given length generally protect a greater length of corresponding shoreline because of this wave energy damping effect. The project also involved installing on-shore stone rip-rap to armor the shoreline. Where bluffs are located along the shoreline, offshore breakwaters were constructed approximately 100 to 200 feet from shore. Offshore breakwaters are 75 feet long, six feet above mean high tide, and are placed 75 feet apart in a semi-circle.

Approximately 8,700 linear feet of severely eroding shoreline were protected between 1993 and 2000 by this project, which was finished in early 1993 at a final cost of $2.75 million. In 2005, dredged material from Kent Narrows—a navigation channel of the Chester River—was deposited behind the breakwaters. Despite the success of the breakwater project, erosion continues to be a problem for Eastern Neck Island's remaining shoreline, especially the southern end.

Future restoration of the shoreline depends on securing funding for planning, design, implementation, and the availability of dredge material. Map 4.1 presents our recommended locations for new shoreline protection projects, with priority given to protecting the Hail Point area. We are very concerned that once the narrow land bridge connecting the island proper to Hail Point is breached, the Hail Point area will quickly erode and disappear. In 2009, a "living shoreline" project was initiated at Hail Cove, in cooperation with U.S. Army Corps of Engineers, MD DNR, Ducks Unlimited, Eastern Waterfowl Festival, and the National Aquarium, along with many funding partners. The objective is to reduce shoreline erosion and restore marsh and reef habitat. In early summer, low profile headland breakwaters were constructed to reduce wave energy. Sand was also placed along the existing shoreline to provide an environment suitable for bay grasses and emergent plants. Volunteers then planted marsh grasses to jump start grass establishment. The project will be closely monitored to evaluate whether more needs to be done in the Hail Point area, and whether the same project design could be used in other areas of the Bay.

While our concern with the loss of wildlife habitat is paramount, it is also important to recognize that shoreline loss threatens some of our visitor facilities and access points. As we develop shoreline protection or stabilization projects, we will consider how we can also safeguard those assets.

Between draft and final CCP, we added plans to expand the amount of refuge shoreline and tidal marsh protection (see also objective 1.1.2 below) to include another area of shoreline increasingly at risk. We added 3,000 feet along the refuge's northern boundary, including Tubby Cove, as an area of concern. Over the past few years, while developing this CCP, shoreline erosion and tidal marsh loss have become more apparent. We are concerned that our *Phragmites* control work close to shore is exacerbating shoreline decline in areas where it is actively eroding. While we do not prefer to retain an invasive, exotic species like *Phragmites*, this plant's deep root system anchors the plant well and helps buffer the shoreline from the erosive forces of wind and high wave action. In some areas, if we continue to remove *Phragmites* close to shore without having established native emergent vegetation or some other buffer, than open water may result with no protection for the shoreline. Retaining *Phragmites* along certain sections of the refuge's actively eroding shoreline may be the best option in the near-term for protecting that shoreline until more permanent measures are in place to stabilize and sustain native marsh development.

Strategies

Continue to:

1) Work with existing partners, including the U.S. Army Corps of Engineers, U.S. EPA, Maryland DNR, National Aquarium in Baltimore, Eastern Waterfowl Festival, Kent County officials, and many corporate and funding partners to maintain and monitor the existing breakwaters. on-shore armoring projects, and living shoreline projects

2) Minimize public access to the refuge shoreline by restricting people to designated trails, especially in sensitive areas

Begin within 3 years of CCP approval:

3) Work with existing partners, and other experts, to conduct an extensive shoreline risk assessment to assist in prioritizing shoreline protection needs and to facilitate restoration proposal development; in particular, determine where *Phragmites* control work should be reduced or eliminated in the near-term because it is the only protection in place where the shoreline is actively eroding (e.g. Tubby Cove area). Develop a monitoring program to evaluate the effectiveness of this strategy

4) Work with existing Service partners, and continue to seek new ones, to prioritize, develop proposals, and obtain funding and required permits for new shoreline protection and restoration projects, with priority given to Hail Point protection

5) Establish a peer-reviewed monitoring protocol to use before and after restoration projects are implemented to be able to objectively evaluate success

6) Establish a GS-7 Biological Technician position to assist in implementing and monitoring the program

Objective 1.1.2 (Tidal Marsh Protection and Restoration):

Over the next 15 years, manage the approximately 859 acres of existing brackish tidal marsh on refuge lands to ensure they are dominated (> 75% of area) by native species such as Olney three-square, saltmarsh bulrush, hightide bush, dwarf spikerush, black needlerush, switchgrass, and big cordgrass. In addition, implement plans to restore up to an additional 108 acres of brackish tidal marsh in conjunction with planned shoreline restoration projects to support trust resources including Virginia rail, horseshoe crab, marsh wren and wintering waterfowl.

Basis for the objective:

The refuge encompasses approximately 859 acres of brackish tidal marsh, comprised of native vegetation, such as Olney three-square, saltmarsh bulrush, hightide bush, dwarf spikerush, black needlerush, switchgrass, and big cordgrass. Unfortunately, *Phragmites* has also invaded some areas, outcompeting native vegetation. About 60 acres of open water exists as pockets interspersed in the larger matrix of tidal marsh vegetation within the refuge boundary, adding to the diversity of this habitat type. The tidal marsh is vital to the integrity of the refuge because it maintains freshwater flow and quality by moderating the effects of floods and droughts as well as filtering out nutrients and sediments. It also provides a buffer that absorbs a major portion of the erosive forces of tides and wave action on the refuge shoreline and uplands. Tidal marshes serve as nursery and spawning habitat for many species of fish and invertebrates, and a wintering area for waterfowl. To sustain these extremely important values, this objective, along with our objective to protect the refuge shoreline, is the highest priority for the refuge.

Besides the marsh grass restoration project, in recent years we have focused on learning more about breeding bird use of these wetlands. In particular, we have been interested in whether king rail, Virginia rail, and marsh wren are present and breeding. By conducting surveys, we can better understand what habitats individual species prefer on the refuge, their seasons of use, and what causes disturbances. This information will provide us a basis on which to make management decisions.

Strategies

Continue to:

1) Work with existing partners, including U.S. Army Corps of Engineers, to place dredged material at specific restoration sites

2) Plant native marsh grasses, supported by volunteers and partners' funding as part of the shoreline restoration project

3) Conduct long-term monitoring of restoration activities in partnership with the National Aquarium in Baltimore, Friends of Eastern Neck and volunteers

4) Restrict public access to designated trails at Tidal Marsh Overlook Trail, Tubby Cove, Bayview Butterfly Trail, Boxes Point Trail, and Duck Inn Trail

5) Conduct waterfowl and secretive marsh bird surveys according to regional protocol

Begin within 3 years of CCP approval:

6) Continue the work with partners to plant native marsh grasses, but identify some dredge material areas to remain open to promote use by certain wildlife that prefer open sandy areas (e.g. diamondback terrapins, horseshoe crab, and native tiger beetles)

7) Ensure monitoring protocol is peer-reviewed and objectively evaluates success in restoration areas

8) Pursue marsh restoration project design and development in conjunction with shoreline protection measures under objective 1.1.1 above

9) Manage *Phragmites* and other exotic, invasive plants in marshes; however, in conjunction with shoreline protection strategies, determine where *Phragmites* control work should be reduced or eliminated in the near-term because it is the only protection in place where the shoreline is actively eroding (e.g. Tubby Cove area). Develop a monitoring program to evaluate the effectiveness of this strategy.

10) Use approved herbicides and prescribed burning where they are determined to be the most effective tools and implement according to annual plans

11) Initiate discussion with MD DNR about strategies to minimize activities occurring off refuge that are impacting tidal marshes

12) Establish a GS-7 Biological Technician position to assist in implementing and monitoring the program (same position as listed under objective 1.1.1)

Objective 1.1.3 (SAV Beds and Shallow Water Habitat Protection):

Over the next 15 years, manage refuge lands to ensure there is no contributing adverse impact to submerged aquatic vegetation beds, which are critical habitats for inter-jurisdictional fish and wintering waterfowl. Actively engage in inter-jurisdictional partnerships to protect water quality and restore at least 500 acres of beds and shallow water habitats in the lower Chester River Basin.

Lee Karney/USFWS

Ruddy duck

Basis for the objective:
The refuge is situated in the broadly extensive mesohaline estuaries portion of the Bay (MD DNR 2005). This habitat is defined as "Chesapeake Bay and Coastal Bays" tidal waters that normally range from 5 to 18 parts per thousand salinity. Because of the connection with upstream high productivity habitat, animal and plant biomass is quite high in these shallow waters. In addition, juvenile anadromous fish, summer migrants (e.g., weakfish, menhaden, bluefish), and developing blue crabs move into these habitat areas and bring additional biomass (see objective 1.4.1 for additional information on inter-jurisdictional fish conservation). Critical shallow water features created by plants and animals include SAV beds, clam and oyster beds, and bare mud, silt and/or sandy bottoms. Plant life may consist of macroalgae and 15 species of SAV, including widgeon grass, eelgrass, sago pondweed, wild celery, redhead grass, and sea lettuce. The distribution and abundance of flora varies with water clarity, nutrient loads and other factors. SAV play an important ecological role by providing habitat for small forage fish, shellfish, benthic surface and sub-surface assemblages, and as food for waterfowl. The Bay-wide decline in SAV distribution and abundance is considered to be a primary cause of the decline in those waterfowl populations that rely on aquatic habitats for food (Funderburk et al. 1991).

Historical estimates of the geographic extent of SAV beds supported by the Bay are estimated at greater than 200,000 acres. As of 2003, 70 percent of the bay grasses had been lost. Such declines can have a dramatic impact on wintering waterfowl populations. The restoration of SAV has long been an important goal of the Chesapeake Bay Program (CBP) and its partners. In 2003, MD DNR and its Bay partners proposed a new goal and strategy to accelerate the protection and restoration of SAV in the Chesapeake Bay and its tidal tributaries. The goal calls for the protection and restoration of 185,000 acres of bay grass by 2010.

SAV and shallow waters near the refuge also support a high diversity of waterbirds and waterfowl. A 2005 inventory by VIMS suggests that the refuge and immediately adjacent state waters support approximately 500 acres of SAV and clam beds. These waters provide foraging habitat for hundreds of avian species, including numerous species identified by the ACJV and MD DNR (2005) as conservation priorities. Wintering waterfowl and waterbirds such as American black duck, canvasback, redhead, loons and grebes depend heavily on the presence of SAV beds in portions of the bay in Maryland (ACJV 2009). Based on our weekly survey counts over the last 10 years, some 7,000 to 13,500 waterfowl, or a 10-year average of 10,000 waterfowl, stop over or winter in the lower Chester River basin on and near the refuge.

Species listed by the State of Maryland as of greatest conservation need (GCN) associated with shallow waters and SAV beds include the American black duck, bald eagle, brant, canvasback, ruddy duck, northern diamond-backed terrapin, American shad, and horseshoe crab. Management plans and conservation programs for waterfowl, game fish and shellfish are currently being implemented by MD DNR, the Service, and many other partners in the area (MD DNR 2005).

Among the many threats to these SAV beds and shallow water habitats are development, agriculture, oil and chemical spills, and other pollution sources. These sources include metalloids, changes in pH, thermal and toxic discharges, nutrients (especially nitrogen and phosphorus), and sedimentation that result in water quality degradation. Other human activities and recreation result in habitat degradation, and invasive non-native species.

Maryland's recommended conservation actions for this estuarine environment include:

1) Reestablishing and conserving SAV beds in areas where they formerly occurred and where water quality has improved since their disappearance;

2) Developing land management plans which incorporate conservation measures into the local planning processes;

3) Initiating measures to protect, maintain, and improve all species habitats and populations through coordinated efforts with various programs, especially the Chesapeake Bay Program; and,

4) Implementing BMPs to reduce non-point source impacts and erosion control measures and promote the protection and preservation/restoration of aquatic/riparian communities.

An important land conservation measure for SAV protection and water quality improvement is the establishment of a naturally vegetated, forested buffer along the shoreline, separating human land uses and sensitive land and water resources (MD CAC 2007). The State of Maryland enacted the Critical Area Act requiring establishment of a minimum buffer of 100 feet of natural vegetation landward from the mean high water line of tidal waters, or the edge of tidal wetlands, and tributary streams. A forested buffer acts as a filter for the removal or reduction of sediment, nutrients, and toxic substances which enter adjacent waterways in land run-off. It also minimizes the adverse impact of human activities on habitat within the Critical Area. On the refuge, we would meet or exceed these forested buffer guidelines as part of our best management forestry practices.

We also use best management farming practices in our cropland management program to ensure that the quality of water runoff from the refuge does not impair SAV beds and other shallow water habitats. We maintain sediment basins and green waterways, and adhere to strict requirements, including a rigorous review by our Regional Contaminants Specialist, when using herbicides.

We do not have direct authority to manage the SAV beds or shallow water habitats of the lower Chester River Basin because refuge jurisdiction ends and state jurisdiction begins at the mean high waterline. However, we indirectly influence these environments through management activities on the refuge that affect the quality of water runoff into the Bay. Adhering to best management forestry and farming practices on refuge lands minimizes concerns with creating adverse impacts. We can also positively affect SAV beds and shallow water habitats by our participation in partnerships that contribute to water quality improvement and habitat restoration.

Strategies

Continue to:

1) Monitor water quality every two weeks at Bogles Wharf, Butterfly Pond, Cedar Point Pond, and Headquarters Pond when volunteers are available

2) Implement best management farming and forestry practices, including the maintenance of grass and forested buffers, green waterways, and sediment basins; and, ensure we meet or exceed state forested buffer requirements

3) Support our partnerships dealing with water quality and marsh habitats in the lower Chester River Basin with Natural Resource Conservation Services (NRCS), the Chester River Association, the National Aquarium in Baltimore, Virginia Institute of Marine Science (VIMS), MD DNR, the Service's Chesapeake Bay Field Office, Ducks Unlimited (DU), the Chesapeake Bay Foundation, Army Corps of Engineers, and others

4) Work with MD DNR to manage mute swan populations in the vicinity of the Refuge.

Begin within 1 year of CCP approval:

5) Actively engage in the exchange of technical information, identifying showcase or demonstration projects, and/or supporting research to promote water quality improvement, SAV protection, and marsh restoration through partnerships with NRCS and Chester River Association, National Aquarium in Baltimore, Environmental Protection Agency, Army Corps of Engineers, VIMS, MD DNR, the Service's Chesapeake Bay Field Office, DU, the Chesapeake Bay Foundation, and other partners. Sponsoring expert meetings, workshops, conferences, research, and field visits are examples of ways to further engage partners. Use the Chesapeake Marshlands NWR Complex Annual Science forum as a venue.

6) Initiate discussion with MD DNR about management strategies to minimize activities that are impacting SAV beds and shallow water habitats

Begin within 3 years of CCP approval:

7) Establish a GS-7 Biological Technician position to assist in implementing and monitoring the program (same position as listed under objective 1.1.1)

SUBGOAL 2: As part of a regional partnership to conserve Chesapeake Bay waterfowl, manage refuge habitats to help sustain wintering populations of migratory waterfowl in the lower Chester River basin and contribute to North American Waterfowl Management Plan population goals for the Chester River and Kent County Bayshore Focus Area.

Rationale for subgoal:
The Chester River and Kent County Bayshore Focus Area (see map 1.3) supports some of the most important wintering habitat in the state for American black duck and wintering geese according to the Atlantic Coast Joint Venture Focus Area Report (ACJV 2005). The refuge is the only protected land in the focus area, which encompasses about 275,000 acres from the Elk and Bohemia Rivers in the north to the mouth of the Chester River, including the Sassafras River and more than 40 named tributaries. The focus area is important for large numbers of wintering waterfowl and supports approximately 200,000 Atlantic Population (AP) Canada geese. Waterfowl hunting is the second or third most important industry in the area, although it is not allowed on the refuge (USFWS 2008b).

The ACJV focus area supports important SAV beds critical to breeding and wintering waterfowl in the Atlantic Flyway. Approximately one third of Maryland's population of American black duck (about 6,000) utilizes the focus area and, as stated above, it is also an important area for wintering geese. It is also an important area for wintering scaup and up to 120,000 individuals have been recorded. As a recent indication of the numbers of waterfowl species wintering in the focus area, the 2003 survey counted 196,000 AP Canada geese, 38,800 snow geese, 18,000 scaup (114,000 during 2002 surveys), 14,200 canvasback, 10,300 mallards, 4,000 American black ducks, 3,800 ruddy ducks, 1,500 merganser, 800 tundra swans (2,300 in 2002), 400 bufflehead, 300 ring-necked duck, 300 mute swan, and 100 common goldeneye (ACJV 2005).

More recent information available on the use of the area from 2004 to 2007 Midwinter Waterfowl Survey (MWWS) data reinforces the importance of the Chester River Basin. The MWWS is conducted at the same time each winter in each state in the Atlantic Flyway, from Maine to Florida. When pooled with the results from other states, the survey provides a long-term measure of the

distribution and population size for waterfowl species wintering in the Atlantic Flyway. It is especially helpful in tracking the population size of Eastern population tundra swans and Atlantic brant for which breeding ground surveys have not been done. The following excerpts from the survey show the importance of the lower Chester River Basin to Maryland wintering waterfowl.

From the 2007 MWWS: The survey was flown between December 27, 2006 and January 4, 2007. A total of 478,900 birds were counted in the lower Chester River Basin, which was a substantial decrease from last year's count of 577,100. This year tributaries and bays along the Chesapeake were completely ice-free. Since the Maryland Midwinter Waterfowl Survey only covers the tidal, estuarine waters, it is likely that many ducks and geese remained inland on open freshwater reservoirs, lakes and ponds that are normally ice covered.

From the 2006 MWWS: The largest concentrations of mallards were observed in the lower Chester River, downriver of Chestertown. Large numbers of scaup were observed on the lower Chester River, Langford Creek, and the mouth of the Northeast River on the Eastern Shore. Canada geese this year numbered 305,400; 20 percent lower than the 383,400 geese observed in 2005. Mild weather contributed to Canada geese and other waterfowl being located inland from the Bay on freshwater ponds, unlike survey conditions in 2005 when ponds were frozen and geese were concentrated along rivers and Chesapeake Bay. Inland areas in Cecil, Kent, and Queen Anne's Counties that contain substantial numbers of wintering geese are no longer surveyed. Because midwinter estimates reflect a mix of resident and migrant Canada goose stocks, these survey estimates are no longer used to guide hunting regulations. Regulations change in accord with the population status of Atlantic and Resident Populations of Canada geese, which are tracked using breeding population and productivity surveys conducted each spring.

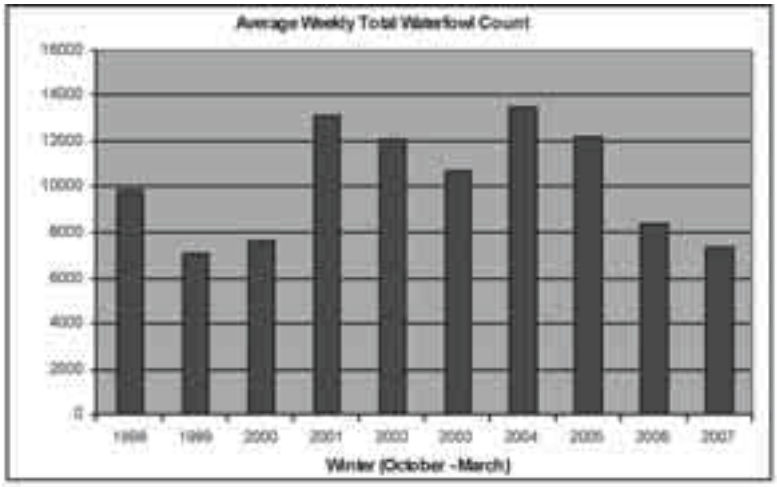


Figure 4.1 Average total waterfowl numbers seen in weekly winter surveys in the vicinity of Eastern Neck Refuge

From the 2005 MWWS: Total dabbling ducks in the lower Chester River Basin survey were estimated at 82,800; a decrease from 94,300 in 2004. Mallards this year increased to 52,800, up from the 48,200 counted in 2004.

Large numbers of mallards were observed in the lower Chester River, downstream of Chestertown. Large numbers of scaup were observed on the lower Chester River and the mouth of the Northeast River on the Eastern Shore.

The refuge, and the immediately adjacent lower Chester River, hosts thousands of waterfowl every year. Weekly October to March refuge survey data from the past decade (figure 3.1) indicates the average numbers of waterfowl of all species seen on the refuge, and in its immediate vicinity, range from 7,000 to nearly 14,000 birds.

Our management of the refuge contributes to enhancing the area for wintering and migratory waterfowl, shorebirds, and waterbirds. The refuge croplands, green tree reservoirs, moist soil management units, and ponds provides sanctuary, feeding and resting areas, and protection from severe winter weather for many species of wintering waterfowl, as well as food and cover for those waterfowl, shorebirds, and waterbirds migrating through.

Objective 1.2.1 (Cropland Management for Waterfowl):

Over the next 15 years, provide a high energy forage source and protection from human disturbance on refuge lands, primarily for wintering Atlantic Population Canada geese and American black duck, and for other wintering and migratory waterfowl. Achieve this by consolidating approximately 403 acres of the most productive cropland fields, and enhancing the quality, quantity, and availability of forage in those fields.

Basis of the objective:
The lower Chester River Basin, including the refuge, historically has been extremely important to migrating and wintering AP Canada geese. The species has been a focus of management since the mid-1940s. The Chesapeake Waterfowl Management Plan, the North American Waterfowl Management Plan, and the Canada Goose Management Plan for Maryland recognize the importance of the refuge in managing for this species. The Chester River winters over 100,000 AP Canada geese, more than any other area on the East Coast — and thousands utilize the refuge, which offers sustenance as well as sanctuary (USFWS 2003a).

Over the last decade, we averaged about 1,800 AP Canada geese per day using refuge croplands in weekly October to March surveys, with as many as 5,000 geese counted on a single field on one survey day. The fields are also used occasionally by American black ducks and mallards, and recently, tundra swans have been seen using the fields.

We believe that active management of croplands is integral to achieving this objective for the foreseeable future. According to Bill Harvey, waterfowl expert with MD DNR, the refuge makes a significant contribution to conserving the regional waterfowl population by providing them a sanctuary during the intensive Chesapeake Bay waterfowl hunting season, coupled with having readily accessible high energy forage available at the same time (Harvey, personal communication 2009). The refuge's croplands can also be very important to the region's migratory waterfowl during harsh winters when croplands on private farm fields have been harvested and the ground and water are frozen. The crops planted are rich in carbohydrates that help sustain the bird's energy reserves during extreme conditions. Year round, the refuge's croplands supplement the natural foods provided in tidal marshes, SAV beds, and other shallow water habitats. Unfortunately, these natural food sources have been severely compromised, if not lost, over past decades and their availability to waterfowl has greatly diminished. We previously discussed the many conservation partners working to restore these shallow water habitats in the Bay, but this will take some time to reach levels recommended in the Chesapeake Bay Program's plan.

We will continue to evaluate the need for, and extent of, our cropland program as natural food sources are increased through restoration activities.

We will strive to make a more efficient and effective field operation without diminishing the value of the refuge to wintering and migrating waterfowl in the region. We plan to maintain only those fields that have consistent high waterfowl use, enhance our moist soil unit sites (see objective 1.2.2 below), and/or offer a quality, roadside wildlife viewing opportunity. This change will result in an overall reduction of cropland acres from the existing 557 acres to approximately 403 acres. However, we will also leave more grain in the fields than is currently being left (approximately 20% under present management), and we will annually evaluate the crop rotation in each field to determine the best combination given existing or predicted environmental conditions. In addition to our plans to leave considerably more grain standing in the fields, we plan to leave it up later in the winter to provide forage when most other fields in the region are depleted. We also plan to remove some hedgerows and create larger fields to improve management efficiency and increase interior field habitat which geese tend to prefer over edge habitat. Certain other hedgerows will remain in place, as depicted on map 4.1, to protect fields from soil loss due to wind and storm events, contribute to wildlife habitat diversity, and facilitate quality, roadside wildlife viewing opportunities.

We will also conduct an objective, peer-reviewed study to evaluate the refuge's cropland management program, in conjunction with our successes in tidal marsh and SAV bed restoration. There have been discussions within our agency about the value and importance of farming on refuges to meet management objectives. An adaptive management process will be implemented to provide guidance for refuge decisions on the best management options for providing habitat for wintering waterfowl.

Wintering waterfowl will also benefit as we continue our partnership activities, as described in Objective 1.1.3, to help protect SAV beds, tidal marsh, and other shallow water habitat near the refuge and elsewhere in the lower Chester River basin.

Strategies
Continue to:

1) Use cooperative farming as a tool for maintaining and managing croplands; make annual adjustments through the Cooperative Farming Agreement

2) Employ sustainable, best-management farming practices that prevent sediment, chemical, and nutrient runoff into the Chesapeake Bay, including the use of:
   a) Crop rotation
   b) Cover crops
   c) No-till planting
   d) Grass waterways and field borders
   e) Nitrogen-fixing, weed-controlling crops to reduce the need for chemical fertilizers and herbicides
   f) Soil testing and addition of soil amendments when needed
   g) Riparian and shoreline buffer zones

3) Limit chemical treatments on the refuge to only the minimum level needed to meet objectives and only use those approved for use on the refuge

4) Maintain croplands through regular soil testing, the addition of soil amendments, and best management farming practices, including developing and utilizing an Integrated Pest Management Plan

5) Exclude the public from accessing cropland fields during winter to minimize disturbance to wintering waterfowl

6) Maintain closure of Ingleside Recreation Area and access road from October 1 to March 31 each year to minimize disturbance to waterfowl. The only exception is allowing access to designated areas during refuge hunts

7) Conduct weekly ground-based waterfowl surveys from October to March on refuge and the surrounding water

8) Prohibit hunting of waterfowl on refuge lands

Begin within 3 years of CCP approval:

9) Initiate the cropland field reduction and consolidation as depicted on map 4.1, including removal of certain hedgerows

10) Complete an evaluation and analysis of methods for managing cropland fields in an effort to determine what combination of actions would best meet our waterfowl goals over the long-term on the reduced cropland acreage. Consideration would be given as to the balance among or between cooperative farming, force account work, and contracting, and determining what is practicable, sustainable, and efficient. The evaluation would also result in a detailed implementation plan that would be incorporated into the HMP, and annual HWP as appropriate. A new compatibility determination for cooperative farming would be developed, if appropriate, reflecting any changes in that economic activity.

11) Coordinate with the Regional Biologist and waterfowl experts to establish a more rigorous survey protocol to assess waterfowl use in crop fields at various times throughout the year

12) Develop and utilize an Integrated Pest Management Plan

13) Establish a GS-7 Biological Technician position to assist in implementing and monitoring the program (same position as listed under objective 1.1.1)

Objective 1.2.2 (Moist Soil Units for Waterfowl and Other Birds):

Over the next 15 years, provide resting areas and high value forage (e.g. smartweed spp., millet, bidens, spikerush and sedge spp.), primarily for wintering and migrating waterfowl such as American black ducks, mallards, pintail, widgeon, and wood ducks, but also for other migrating birds, by maintaining six moist soil management units comprising 50.5 refuge acres. Water levels in two of the moist soil units (approximately 28.4 acres total) would be seasonally managed by manipulating water control gates each year. In the other four moist soil units (approximately 22.1 acres total), water control gates would remain in place throughout the year and water levels would be influenced primarily by natural fluctuations in precipitation and groundwater.

General management purposes and objectives for individual units by season follow:

Headquarters Pond Impoundment (seasonally managed; approximately 10 acres)

This impoundment lies above, but connected to a pond which was formed when the road (into the original refuge headquarters) was constructed over 30 years ago in conjunction with the planned Cape Chester Housing development. A portion of the road forms the pond dike, which contains a stop-log type water control structure and allows for the seasonal control of water levels described below.

a. Spring (March–April) Migrating Waterfowl: Provide approximately 10 acres of resting and feeding habitat, consisting of remnants of the previous growing season, such as mixed annual and perennial marsh vegetation. When at full pool level (6 feet) the surrounding hardwood forest, which is dominated by species of gums and oaks, would also be flooded providing up to an additional acre of habitat.

b. Spring (April–June) Migrating Shorebirds, Marsh and Wading Birds: Begin a gradual drawdown by early to mid-April to provide exposed mudflats for foraging shorebirds, marsh and wading birds.

   1. By May, provide approximately 8 acres of feeding habitat consisting of shallow water (<6 inches deep) to mudflat habitat with sparse to no vegetation (<15% coverage), during the normal peak shorebird migration of early to mid-May. Encourage the production of invertebrates for shorebird food by drawing the water off slowly and concentrating invertebrates in shallow water wetlands and exposed mudflats.

   2. By early June, manage water control gates to reach the desired water level of 3.0 to 3.5 feet in the pond for the annual Youth Fishing Derby held in mid-June.

c. Summer (July–August) Wading and Marsh Birds: During July through August, provide between 1-3 acres of quality feeding habitat for wading and marsh birds. This habitat would consist of open, shallow water (2-10 inches deep) with patches of emergent wetland plants that support fish, invertebrates and amphibians. Highest quality areas are those patches where prey is concentrated following water drawdown.

d. Fall (September–October) Migrating Waterfowl: Close water control structure by early September. This impoundment is dependent on rainfall and the quantity and timing of autumn rain accumulation will dictate how much desirable habitat would be present at the time most migratory waterfowl arrive in October and November.

e. Winter (November–February) Waterfowl: Provide approximately 10 acres of resting and feeding habitat consisting of shallow flooded (<12 inches water depth) moist soil vegetation dominated principally by large-seeded perennial, and smaller seeded annual, marsh plants (e.g. sedges, rushes, smartweeds, and three-square, mixed with smaller areas of moist-soil annual plants, beggar's ticks, wild millets, and submerged aquatic vegetation). If the pool level is high enough, an additional acre of adjacent flooded hardwoods will also be provided.

Shipyard Creek Impoundment (seasonally managed; total area approximately 18.4 acres flooded portion, 7 acres)

a. Spring (March–April) Migrating Waterfowl: Same as above, on 7 acres.
b. Spring (April–June) Migrating Shorebirds, Marsh and Wading Birds: Same as above, on 7 acres.
c. Summer (July–August) Wading and Marsh Birds: Same as above, on 7 acres.
d. Fall (September–October) Migrating Waterfowl: Same as above.
e. Wintering (November–February) Waterfowl: Same as above, on 7 acres.

Other Moist Soil Units (Low maintenance; 4 units; approximately 22.1 acres total)
Up to four impoundments would have water control structures in place for potential management capability; however, they would not be manipulated except during emergency situations. The water control structures would remain closed throughout the year, allowing water to collect naturally from autumn precipitation and dissipate through soil percolation, transpiration, and evaporation throughout the rest of the year. While the quantity and timing of available water will vary each year with natural precipitation, the intent is for the peak amounts to occur to provide valuable waterfowl habitat during migration and winter. These habitat units would consist of shallow, flooded areas with mixed annual and perennial marsh vegetation dominated by smartweeds, sedges, and grasses. They would be surrounded by up to approximately 5 feet of grassy buffer adjacent to croplands.

Basis of the objective:
Native herbaceous vegetation (i.e. smartweed and various rushes and sedges) adapted to germination in hydric soils (i.e., moist-soil plants) provide waterfowl with nutritional resources, including essential amino acids, vitamins, and minerals that occur only in small amounts or are absent in other foods. These elements are essential for waterfowl to successfully complete aspects of the annual cycle such as molt and reproduction. Moist-soil vegetation also has the advantages of consistent production of foods across years with varying water availability, low management costs, high tolerance to diverse environmental conditions, and low deterioration rates of seeds after flooding.

Moist soil management units (MSUs) also promote invertebrate production. Invertebrates provide the critical protein-rich food resources required by pre-breeding and breeding female ducks, newly hatched waterfowl, and molting ducks and shorebirds. Peak use of the refuge's MSUs by waterfowl as indicated by the highest numbers seen on any winter survey day in our refuge ground surveys over the last decade has been 800 American black duck, 1,150 mallards, 39 teal, and 35 wood ducks. Due to the high value of these MSUs to waterfowl, we will manage them to maximize their benefit and minimize the occurrence of unwanted or invasive plants.

We will increase the number and distribution of MSUs by three over what we have today, which we expect will also improve the diversity of waterfowl using the refuge. In our professional judgment, this modest expansion plan represents the best and most realistic program to implement over the next 15 years, given our other habitat priorities. Additionally, our recent field review of potential MSU sites indicates that the island's soils and topography does not lend itself to the construction of extensive MSU complexes. The slope of the island increases the cost of construction and maintenance, and we do not support development of numerous, small, inefficient units which are much more expensive to maintain on a cost/acre basis. We believe it is most important to evaluate, and if needed, improve on the structures we have in place, while implementing this modest expansion, to insure we are developing the most effective and efficient designs. If our monitoring over the next 15 years indicates a high resource value, a further expansion of MSU's could be evaluated during development of the next CCP.

We have tentatively identified locations for the proposed three new units on map 4.1. These locations are based on preliminary field reviews conducted with partners. They are subject to change, or elimination from consideration, after we conduct more detailed field reviews evaluating feasibility and resource impact. For example, soils and engineering testing, an archeological and historic site survey, and a cost/benefit evaluation will be conducted as needed. To address concerns about potential concentrations of lead or other contaminants in the soil or water from past uses including hunting and farming, we would conduct

contaminant sampling and analysis in and around the units at existing and future constructed sites. If concerns arise, we would address each situation as soon as possible in a manner that provides the least impact to wildlife, and protects the health and safety of both wildlife and humans.

Strategies

Continue to:

1) Actively manage Shipyard Creek and Headquarters Pond MSU water levels seasonally as indicated by the objective statement above.

2) Allow the low maintenance MSU to fill with rainwater in the fall/winter and gradually de-water in the spring/summer; intervene in this process only when management objectives are compromised

3) Annually maintain, repair, or replace water control structures as needed to support management objectives

4) Monitor waterfowl use of MSUs as part of the weekly October to March ground surveys

Within 3 years of CCP approval:

5) Establish a GS-7 Biological Technician position to assist in implementing and monitoring the program (same position as listed under objective 1.1.1)

6) Coordinate with the Regional Biologist, MD DNR, and other waterfowl experts and partners to establish a more definitive survey protocol to assess year round waterfowl and other wildlife use of MSUs, especially at the Shipyard Creek location; use collected data to see if use corresponds to stated management objective. Also, utilize this information to learn from this project to help refine design and management for new MSUs.

Begin within 5 years of CCP approval:

7) Complete design and construction of up to 3 new MSUs after positive results from: engineering and soils field reviews, including feasibility studies; archeological and historic surveys recommended by the Service's Regional Archeologist or State SHPO; cost/benefit analysis; and funding forecasts

8) Initiate a regular program of analyzing water quality and soils in and surrounding moist soil units

Objective 1.2.3 (Green Tree Reservoirs for Waterfowl):

Over the next 15 years, enhance management of the five existing green tree reservoirs on the refuge (approximately 38 acres total) primarily to provide foraging and resting areas for wintering waterfowl, including American black duck, mallards, teal, and wood ducks. General management purposes and objectives by season follow**:**

a) Fall (Early October) Migrating Waterfowl*:* Close water control structures by early October (approximately) in anticipation of peak waterfowl migration in November. This would be dictated by the quantity, timing, and accumulation of autumn rains. Water levels would be held between 1 to 18 inches to promote invertebrate production, and allow waterfowl to fully utilize mast and seeds on the ground.

b) Spring (Late February–Early March) Migrating Waterfowl*:* Begin gradual drawdown of impounded water, targeting de-watering to be completed by the time trees break out of dormancy and when the majority of migratory waterfowl have left.

Basis of the objective:
A green-tree reservoir (GTR) is a forested lowland that is temporarily flooded during the fall and winter to attract ducks, mainly mallards and wood ducks, and to some extent, American black duck and teal. Control structures allow water levels to be manipulated. Typically, water is held in the impoundment during the late fall and winter, while the trees are dormant, but also when waterfowl are present and can forage on hard and soft mast detritus and macro-invertebrates. Winter flooding during the dormant season avoids permanent tree damage and possible tree loss. The reservoirs are dominated by oak and gum species such as swamp chestnut oak, sweet gum, and black gum. The GTRs are rotated through a dry period each season to imitate the natural flood regime of forested wetland habitats. Typically, we are actively managing three reservoirs each year.

As we mentioned, the primary source of water for these GTR's is natural precipitation. While the quantity and timing of available water will vary each year, the peak amounts would coincide with highest waterfowl counts during migration and winter. GTR #2, does have a pump attached to a deep well on the refuge. However, refuge staff have determined that use of this pump is not worth the time, effort and cost of fuel to fill the reservoir unless an emergency situation exists. There are also concerns that pumping could adversely affect the amount and distribution of groundwater on this island, especially in a droughty year. In fact, using the pump has been a rare situation— it has only operated once in the last seven years.

Numbers of waterfowl using the GTRs on refuge lands is not necessarily impressive, but in our professional judgment, the numbers alone do not reflect their habitat value. Peak numbers of 80 American black ducks, 400 mallards, and 80 wood ducks have used the reservoirs based on the highest single day count over the last decade. These low numbers may be a result of actual low waterfowl use or they may simply reflect a less than optimal survey protocol. Our current protocol has the reservoirs surveyed from their periphery; surveyors do not typically venture into the interior of the wetlands because of the difficulty of access. We suspect we are missing a number of birds using the core area.

Within five years of CCP approval, our focus will be on monitoring wildlife use and management capabilities of the GTRs to more definitively evaluate their value to waterfowl and other wildlife. We suspect that these GTR areas may be more valuable during winter and early spring, versus during fall migration. In addition, we plan to revise our survey methods to better evaluate waterfowl use in the core of the flooded areas. We also need to determine whether each of the reservoirs can offer quality habitat without major resource investments. One evaluation is whether the native tree species mix in these areas are the most effective. Once we have better information on waterfowl use and habitat values between the reservoirs, we can determine if management should be discontinued for some, or all, of the GTRs, and/or which reservoirs need improvements to optimize management capabilities. A decision whether to remove the pump in GTR #2 would be included as part of this evaluation.

Strategies
Continue to:

1) Manage seasonal water levels in the reservoirs as described in the management objective and in the "basis for the objective"

2) Conduct waterfowl ground survey October–March

Within 1 year of CCP approval:

3) Coordinate with the Regional Biologists, MD DNR and other partners and experts to modify the waterfowl ground survey protocol to obtain a more accurate count of waterfowl using the interior of the GTRs

Begin within 3 years of CCP approval:

4) Establish a GS-7 Biological Technician position to assist in implementing and monitoring the program (same position as listed under objective 1.1.1)

Begin within 5 years of CCP approval:

5) With the results from the wildlife use survey, complete a rigorous evaluation of each GTR to determine whether the level of waterfowl and other wildlife use merits the investment of staff, and operations and maintenance funds; determine whether to continue management and maintenance of equipment, and/or to continue the rotational management currently used. Specifically, determine whether to remove, or more effectively utilize, the pump in GTR #2. Also, as part of the evaluation, determine whether the water holding capacity of the soils in each GTR, and the tree species composition, reduce its potential long-term value to wildlife.

6) Develop and implement a schedule for conducting a contaminant analysis of the water and soils within each GTR

Objective 1.2.4 (Tundra Swan Protection and Conservation):

Over the next 15 years, continue to support partner efforts to sustain at least 2,500 wintering tundra swans annually in the lower Chester River's shallow water habitats, which includes restoring at least 500 acres of SAV and clam beds near the refuge.

Basis of the objective:
Until recently, the Chesapeake Bay was the most important wintering area on the Atlantic Coast for tundra swans. During the late 1960s, more than 40,000 tundra swans wintered on the Bay. But today, more than half of the tundra swan population along the Atlantic Coast winters in North Carolina (Reshetiloff 1995). The decline of SAV beds throughout the Bay area is believed to be the cause of the southern shift of wintering tundra swans. The preferred foods of wintering tundra swans are the tubers, roots and leaves of SAV and marsh plants. As the grasses disappeared during the 1970s, tundra swans, like many other waterfowl, began feeding in farm fields on waste grains, such as corn and soybeans, as well as winter wheat and barley.

Tundra swans nest in Alaska and Canada and migrate to Chesapeake Bay to spend the winter. While tundra swans wintering along the east coast (e.g., adjacent states of Pennsylvania, Virginia and North Carolina) have increased during the past two decades, tundra swans wintering in Maryland have declined about 40% during the past 25 years. Invasive, exotic mute swans have been implicated in this decline. Maryland has the largest population of mute swans in the Atlantic flyway. There is growing concern among wildlife managers that the increase in mute swans in Maryland is contributing to factors that have suppressed population growth among tundra swans wintering in Maryland (Mute Swans in Maryland: A Statewide Management Plan (MD DNR 2003a).

The guts, creeks, and coves surrounding Eastern Neck Island are important staging areas for wintering tundra swans. According to the National Audubon Society, the refuge supports approximately 1% of the Global tundra swan population. Our objective strives to support on-going efforts to restore the natural food sources for tundra swans rather than attempt to provide additional cropland-based foods. Through these partnerships and associated efforts, other

waterfowl which use shallow waters to feed will also benefit. This objective, while focused on tundra swans, is consistent with, and supported by goal 1, subgoal 1, objective 1.1.3 (SAV Beds and Shallow Water Habitat Protection).

Strategies
Continue to:

1) Assist in maintaining an estimated 500 acres of SAV and clam beds around the island (VIMS 2005) by working in partnership with MD DNR and other organizations

2) Control mute swan in cooperation with MD DNR and according to their state mute swan control plan

3) Support partner's research efforts of tundra swan populations and use of habitat, including work with National Audubon Society, MD DNR, and other partners interested in tundra swan

Within 1 year of CCP approval we would:

4) Initiate discussion with MD DNR about management strategies to minimize activities that are impacting SAV beds and other aquatic habitats. This would include reducing disturbance to resting and feeding tundra swans and other waterfowl.

SUBGOAL 3: Manage a variety of upland habitats on the refuge to continue to support the rich diversity of songbirds, raptors, butterflies, and other native wildlife.

Rationale for subgoal:
In 2002 the Service published a compilation of lists of migratory and non-migratory birds of the United States and its territories that are of conservation concern (USFWS 2002a). The lists were compiled at the national, Service-regional, and bird conservation regional (BCR) level and designed to stimulate coordinated and proactive conservation actions among Federal, State, and private partners. Causes for the concerns may be population declines, naturally small ranges or population sizes, threats to habitat, or other factors. Bird species considered for inclusion on lists included non-game birds, game birds without hunting seasons, and Endangered Species Act candidate, proposed endangered or threatened, and recently delisted species. The Service listed 32 species as birds of conservation concern (BCC) in the New England/Mid-Atlantic Coast Bird Conservation Region (BCR 30) (USFWS 2002a). The recently delisted bald eagle expands the list to 33 species. Eighteen of the 33 species are known to occur at Eastern Neck (appendix A) with eight of those seen only rarely and three, the marsh wren, wood thrush, and Baltimore oriole, known to breed here. An additional 15 species that breed at Eastern Neck Refuge are listed by Partners in Flight (Watts 1999) or by the Chesapeake Bay Critical Area (CBCA) Program (Jones et al. 2001) as birds of conservation concern.

In addition to the bald eagle and the BCC-listed peregrine falcon and short-eared owl, the refuge lists 19 other raptors observed here. Eight raptors breed at the refuge: bald eagle, osprey, black and turkey vultures, red-tailed hawk, common barn owl, eastern screech owl, barred owl, and great-horned owl. (USFWS 2006b)

Eastern Neck Refuge also hosts a variety of breeding and migrating butterfly species. Of particular note is the fall migration of Monarch butterflies, which have been observed by the thousands at the southern point of the refuge (Hail Point) where they rest before continuing to cross the Bay on their 2,000 mile migratory flight to Mexico. Other butterflies, such as the black swallowtail, tiger

swallowtail, cabbage white, Eastern-tailed blue, and other pollinators, as well as dragonflies and damselflies benefit from the grassland areas on the refuge and the BayScape garden which serves as their breeding area. Management efforts would focus on conserving productive habitat and preventing disturbance of the Monarch butterfly's resting at Hail Point.

Below we discuss objectives for managing forest and grassland habitats and present our reasons for doing so. We do not have a shrub habitat objective, despite several migratory shrub-dependent birds in this area listed as species of concern. Managing permanent shrub habitat in an amount and distribution on the refuge to make an important contribution to migratory birds would be a challenge. Our biggest concern is the likelihood that invasive plants would be a constant problem. Also, sustaining vegetation in a shrub stage would also require fairly frequent stand manipulations as vegetation on the refuge tends to transition to trees within five years without active intervention. At this time, we do not believe this is the best use of our staff and resources.

Objective 1.3.1 (Forest Habitat Management):

Over the next 15 years, manage approximately 853 acres of mature deciduous-mixed forest habitat on the refuge with a diverse canopy structure. At least 75 percent of the acreage would be in contiguous, un-fragmented blocks of at least 25 acres of native forest, with at least two of those blocks exceeding 100 acres each. The management emphasis is to provide stopover areas for forest-dependent migratory songbirds, and additionally provide nesting habitat for birds of high conservation concern, such as wood thrush, and eastern wood peewee, and nesting and migratory raptors.

Basis of the objective:
Within BCR 30, forested upland communities provide habitat for the second highest number of priority bird species in the region (USFWS 2007b). Coastal forests and woodlands are crucial as migratory stops for Neotropical migrants. Historically, the coastal communities were dominated by contiguous forest. Today, these forests have become highly fragmented by 300 years of land clearing, agriculture, and human development (TNC 2006). Destruction and fragmentation of forests in both breeding and wintering areas are factors in forest bird species declining abundance (Roth et al. 1996). Many of the declining forest birds are also associated with dense understory conditions created by local disturbance; such conditions have become less common due to lack of forest management and over-browsing by white-tailed deer (Rich et al. 2004).

Of particular concern in forest habitats is the decline of forest interior dwelling (FIDs) Neotropical migratory birds which require large contiguous forested tracts to maintain viable populations. A minimum habitat patch size is considered to be at least 50 acres in size with 10 or more acres of "forest interior" habitat (i.e., forest greater than 300 feet from the nearest forest edge). This minimum habitat patch size would only be capable of supporting less area-sensitive FIDs species. The larger the contiguous forest patch, the higher the probability of supporting productive breeding pairs.

Among a number of management recommendations made by ACJV in the BCR 30 for forest birds are:

- Increase/improve active management of forests to improve habitat quality within existing and high priority upland forest (e.g., loss of shrub layer). For example, promote uneven-aged management, thinning to open canopies, etc…

- Manage upland forest communities to provide post-fledging habitat (habitat mosaic, including shrubby areas and openings). Targeted species: wood thrush

- Develop and implement programs to control invasive plant species.

Our ability to manage for viable populations of those breeding FIDs and other forest-dependent birds of conservation concern that require contiguous forest tracts over 100+ acres is limited on the refuge given the current and projected distribution of interior forest habitat. That determination is coupled with the fact the refuge is an island, and lies within a regional landscape matrix dominated by agricultural lands (Dettmers, personal communication 2006). Simply put, there are not enough breeding birds in the area to exchange and sustain a healthy population. However, we do believe refuge lands could make an important contribution to the regional bird populations of such species as wood thrush, and eastern wood peewee. The wood thrush is a highest priority species for conservation concern and the eastern wood peewee is a high priority in PIF Area 44 (Watts 1999).

The wood thrush breeds in the interior and edges of deciduous and mixed forests, generally in cool, moist sites, and often near water. Research results indicate that wood thrushes choose habitats based more on the structure of the forest than on the degree of forest fragmentation in the landscape. Their nest is usually on the lower limbs of a tree or shrub. Since these birds forage on the ground, nest near the ground in a well-developed understory, and are sensitive to the structure, productivity, and configuration of the forest, they are good indicators of forest health and the ability of our forests to support healthy bird populations. The Cornell Laboratory's publication "A Land Managers Guide to Improving Habitat for Forest Thrushes, 2003" provides additional details on minimum area size and species habitat preferences (Rosenberg et al. 2003).

As mentioned previously, the eastern wood peewee is a high priority in PIF Area 44. It is considered a forest interior and forest edge species, and will nest in smaller forest fragments assuming some interior habitat exists. It occurs most frequently in forests with some degree of openness, whether that is a result of forest structure, natural disturbance, or human alteration. Intermediate-aged forests with a relatively sparse mid-story are preferred (The Nature Conservancy 2001). Forest habitat patch size does not appear to be an important factor in habitat selection (Watts 1999).

Other species of conservation concern that would benefit from our forest habitat management are the northern flicker, scarlet tanager, and raptors such as red-shouldered hawk, northern saw-whet and barred owl (see appendix A). We will manage our forest habitat areas in larger, more contiguous blocks than presently exists to better support a wider diversity of forest-dependent and other breeding and migratory birds. As stated in the objective, we would maintain at least two 100+ acre contiguous blocks, while striving for at least 25+ acre blocks in the remainder of the forested stands.

Strategies

Continue to:

1) Reforest cropland sites with native tree species when no longer in use

2) Treat invasive plants that are impacting native forest regeneration; use mechanical, prescribed fire, chemical or biological treatments as warranted depending on the species to be treated. Adhere to regional requirements for planning and review by Regional Contaminants Coordinator

3) Conduct annual landbird survey following regional protocol

4) Document and maintain records of all DFS sightings and forward on to DFS Recovery Team.

5) In cooperation with the DFS recovery team, conduct periodic monitoring activities which may include use of observers and/or cameras

Begin within 3 years of CCP approval:

6) Establish a GS-7 Biological Technician position to assist in implementing and monitoring the program (same position as listed under objective 1.1.1)

Begin within 5 years of CCP approval:

7) Work with partners, such as state and Federal forest management agencies, to conduct a bi-annual forest health assessment; evaluate the risk from pests and pathogens, wildfire, or other threats and determine whether management is warranted to protect the health and integrity of the forest stands. Identify strategies to promote and sustain a healthy, diverse, mature mixed forest with well-developed understory. Incorporate forest management practices into the HMP accordingly

8) Establish a minimum 330 foot forested buffer around the refuge's shoreline and tidal marshes to promote riparian habitat for forested birds, bald eagles and other raptors, and other wildlife and to provide other resource values, such as for water quality and marsh protection

Objective 1.3.2 (Grassland Habitat Management):

Over the next 15 years, manage approximately 40.3 acres of grassland habitat with BayScape garden on the refuge, where at least 50% of those acres are in one contiguous habitat block, free of invasive species, to provide migratory stopover areas for grassland birds and butterflies.

Basis of the objective:
According to the Maryland Wildlife Diversity Conservation Plan (MD WDCP), the grasslands that occurred in Maryland prior to European settlement have all but vanished. However, approximately 240,000 acres of anthropogenic grasslands occur in the state, much of it as pasture, hayfields, and fallow fields. The vast majority (89%) of this acreage is on private land. Most of the state's remaining grassland fauna mostly persists in one or more of the following settings: (1) agricultural fields (e.g., hayfields, pastures, certain croplands, grass buffer plantings); (2) fallow fields; (3) recent clearcuts (within 1-3 years after logging); (4) reclaimed strip mines on the Allegheny Plateau; (5) mowed edges of airports and military airfields; and (6) remnant natural grassland communities. Some grassland species of conservation concern also occur in non-tidal and/or tidal marshes.

The limited availability and fragmented distribution of grassland habitat on the refuge reduces its suitability for breeding grassland birds and for other grassland-dependent taxa. Grassland habitat suitability for all taxa generally increases with the size and area-to-edge ratio at a grassland site. A number of grassland species (e.g., regal fritillary, grasshopper sparrow, Henslow's sparrow) are considered area-sensitive, occurring only in relatively large (>125-250 acre), un-fragmented grasslands, and/or exhibiting positive, area-dependent changes in population density or viability. Depending on the taxon, other important predictors of habitat suitability may include vegetative composition, height, structure and patchiness; surrounding landscape conditions; and topography.

Of the existing 30.7 acres of grassland on the refuge, approximately 22 acres occurs in one contiguous field near the old refuge headquarters (e.g. Cape Chester house). Within that field, a ¼ acre BayScape garden is maintained by volunteers. The remaining 9 acres of refuge grasslands are narrow, linear features lining refuge roads or moist soil management units. Of the additional 10.7 acres that we will create , these are also linear features primarily around

new moist soil units. Those narrower grassland strips may attract some grassland dependent species during migration, but we do not consider them quality breeding habitat for grassland birds.

Of the 20 bird species associated with grassland habitats in Maryland and listed as of greatest conservation need by MD DNR, 10 have been observed on the refuge. In chapter 2, table 2.11, we list those known on the refuge. One species, the field sparrow, is known to breed here, but most are uncommon or rare visitors.

Thirty-six butterfly species were documented on the refuge in five separate surveys conducted during 1998 and 1999, including four swallowtail species, three sulfurs, and nine species of skipper. The BayScape garden hosts a variety of plant species that attract butterflies, other insect pollinators, hummingbirds, other nectar feeders, and seed feeders. The refuge is an important stopover location for migrating monarch butterflies. Migrating monarchs often stop and rest at the southern tip of the refuge at Hail Point and other southern points along the Bay before crossing water. By November, they have usually reached their winter destinations, sometimes 2,000 miles away. The insects will spend the next five months overwintering in a dormant state, massed on the trees in the Gulf States and Mexico. One wintering site may attract millions of butterflies (Reshetiloff 2006)

The MD WDCP lists 19 recommended conservation measures to benefit grassland dependent species of greatest conservation need. The following are relevant to the refuge:

- Develop and implement protocols to control invasive species in a manner compatible with GCN species
- Restore and maintain native grassland communities
- Utilize appropriate prescribed burning in or light disking of selected portions of individual fields to maintain mid-successional seral stages and increase coverage of tall forbs
- Limit the use of pesticides such that GCN species and this habitat are not adversely affected
- Incorporate best management practices into land management plans
- Limit access and educate the public about the value of these habitats to minimize human disturbance
- Encourage the use of native seed stock for warm season grass plantings
- Convert agricultural fields on public lands to grassland habitat where feasible

Strategies

Continue to:

1) Maintain grasslands through prescribed burning and mowing
2) Treat invasive plants using herbicides, mechanical, biological, and fire treatments as needed
3) Reseed using native grasses, where appropriate

4) Work closely with volunteers to maintain and enhance BayScape garden, to seek grants and other funding sources for its upkeep, and to conduct outreach and education for others interested in BayScaping

5) Monitor butterfly use using volunteers and other conservation partners

Within 3 years of CCP approval:

6) Establish a GS-7 Biological Technician position to assist in implementing and monitoring the program (same position as listed under objective 1.1.1)

Objective 1.3.3 (Bald Eagle Conservation):

Over the next 15 years, manage mature forested habitats on the refuge to protect historic, current, and potential bald eagle nest sites and active nesting pairs of bald eagles. Also, identify and protect winter roost sites.

USFWS

Bald eagle

Basis of the objective:

Bald eagles, which were removed from the Federal Endangered and Threatened Species List in 2007, have successfully returned to breeding in most of Maryland's counties with 383 nesting pairs documented in 2004. An increasing number of bald eagles are over-wintering in Maryland as well (MD DNR 2005). The removal of the bald eagle from the Federal list was predicated on the assumption that they would continue to thrive in areas they presently occupy. As a result, we will continue to be concerned about their health, productivity, and any disturbance or threats during nesting season. As we noted in chapter 1, the bald eagle continues to be protected by the Bald and Golden Eagle protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA).

In the Bay region, eagle pairs build their nests from October through January, lay eggs from January to April, rear young from February through June and the young eagles fledge from May to August. During this entire period, eagle reproductive success may be adversely affected by human disturbance. If agitated by human activities, eagles may inadequately construct or repair their nest, may expend energy defending the nest rather than tending to their young, or may abandon the nest altogether. Activities that cause prolonged absences of adults from their nests can jeopardize eggs or young. Depending on weather conditions, eggs may overheat or cool too much and fail to hatch. Unattended eggs and nestlings are subject to predation. Young nestlings are particularly vulnerable because they rely on their parents to provide warmth or shade, without which they may die as a result of hypothermia or heat stress. If food delivery schedules are interrupted, the young may not develop healthy plumage, which can affect their survival. In addition, adults startled while incubating or brooding young may damage eggs or injure their young as they abruptly leave the nest. Older nestlings no longer require constant attention from the adults, but they may be startled by loud or intrusive human activities and prematurely jump from the nest before they are able to fly or care for themselves. Once fledged, juveniles range up to ¼ mile from the nest site, often to a site with minimal human activity. During this period, until about six weeks after departure from the nest, the juveniles still depend on the adults to feed them (USFWS 2007f).

The Service developed the National Bald Eagle Management Guidelines (USFWS 2007f) to help minimize impacts to bald eagles, particularly where they may constitute disturbance. To avoid disturbing nesting bald eagles, we recommend (1) keeping a distance between the activity and the nest (distance buffers), (2) maintaining preferably forested (or natural) areas between the activity and around nest trees (landscape buffers), and (3) avoiding certain activities during the breeding season. The buffer areas serve to minimize visual and auditory impacts associated with human activities near nest sites. Ideally, buffers would be large enough to protect existing nest trees and provide for alternative or

replacement nest trees. On Eastern Neck Island, we are using 330 feet as a minimum forested buffer width along the shoreline.

We have some indication that a number of bald eagles may be roosting on the refuge in winter. We would like to verify this, and if so, manage to protect that roosting habitat and the eagles using it. We also plan to initiate discussions with the MD DNR to evaluate the need for expanded protection of nesting sites on the refuge that may be disturbed by boaters from the waterside. Activities on the water fall under the jurisdiction of the state.

Strategies

Continue to:

1) Maintain a forested buffer zone of about 330 feet along the refuge shoreline to provide future nesting trees for bald eagles and to provide a buffer that minimizes disturbance from watercraft as recommended in the Service's Bald Eagle Management Guidelines (2007); plant trees where necessary to insure forested habitat will establish

2) Protect active nests and do not disclose their locations nor allow public use in the vicinity of nests

3) Participate in hacking programs to supplement or jump-start populations in other areas, in partnership with other state and Federal agencies

4) Continue annual active nest searches in later winter (February-March)

Begin within 3 years of CCP approval:

5) Survey for winter roosting eagles to determine if important areas are present

6) Cooperate with the state in developing a regulation that establishes a no disturbance zone along the shoreline to minimize impact to nesting bald eagles

7) Establish a GS-7 Biological Technician position to assist in implementing and monitoring the program (same position as listed under objective 1.1.1)

SUBGOAL 4: Enhance management, protection, and monitoring of interjurisdictional fish and other aquatic species on the refuge and in surrounding waters.

Rationale for subgoal:

The National and Northeast Regional Strategic Fisheries plans include a vision to "restore and maintain self-sustaining populations of native fish and other aquatic resources that maintain species diversity provide recreational opportunities for the American public, and meet the needs of tribal communities" (http://www.fws.gov/northeast/fisheries/).

The Bay's fish and other aquatic resources are among the richest and most diverse in the Nation. These resources, and the recreational, commercial, and intrinsic values they provide, have produced enormous ecological, social and economic benefits. However, despite efforts by the Service and others to conserve fish and aquatic resources, a growing number are declining at alarming rates. Dozens of aquatic species either have, or need, special protection in some part of their natural or historic range. Many of the anadromous fish species which spawn in the Bay, but spend most of their lives at sea, require extensive cooperative programs for restoration and management among numerous state and Federal agencies. These fish include the highly valued and historically important American shad, river herrings, Atlantic salmon, sturgeons, and striped bass.

The reasons for declines in aquatic populations are linked largely to habitat loss or alteration -including flow changes, dams and other watershed modifications, sedimentation and pollution - and the impacts of harmful exotic or transplanted species. Dozens of species of non-native fish and mollusks have been introduced to the Bay and tributary waters.

Biological and social scientists, government agencies, conservation groups, and the American public are becoming increasingly concerned about the decline of the Bay's fish and other aquatic resources and the economic impact of those declines. They point with increasing urgency to actions that must be taken to reverse these alarming trends. Management and conservation of virtually all fish and other aquatic resources are a shared responsibility. Success in reversing the trend will rely on continuing existing partnerships, and forging new partnerships, that cut across jurisdictions and link all affected stakeholders.

Objective 1.4.1 (Interjurisdictional Fish Conservation):

Over the next 15 years, continue active participation in partners' efforts to protect and monitor interjurisdictional fisheries in the lower Chester River Basin and nearby portions of the Chesapeake Bay.

Basis of the objective:
Interjurisdictional fisheries are freshwater, coastal, or marine fish populations managed by two or more states, nations, or tribal governments because of their geographic distribution or migratory patterns (Conserving America's Fisheries, Fisheries Program Vision for the Future, September 2002, page 25). In addition, the Region 5 Fisheries Program includes the following guidance,

> *"Interjurisdictional fisheries must be under the jurisdiction of and managed by two or more states, nations, or tribal governments. The general standard for inclusion in this category is the existence of an interagency management plan among two or more states, nations or tribal governments or other similar formal agreement that specifically identifies the native species or population of interest and identifies a role for the Fish and Wildlife Service; and the Fisheries Program has or intends to have a consistent commitment to species restoration as evidenced by approval by Region 5 Fisheries (or higher level within the Fish and Wildlife Service). Interjurisdictional species or populations, not covered by such a plan or agreement, will be considered on a case-by-case basis" (http://www.fws.gov/northeast/fisheries/).*

The Chester River provides spawning and nursery habitat for 9 anadromous fish species and 12 interjurisdictional species, 2 of which have State of Maryland endangered species status (USFWS 2006a).

Shortnose sturgeon

Duane Raver/USFWS

The update to the 2004-2008 Northeast Regional Fisheries Strategic Plan is in progress. The team has completed a list of aquatic species of conservation concern for the watershed that includes the refuge. Regional species of concern are defined as "…species in Region 5 for which Federal responsibilities for restoration, recovery or management have been identified, and for which the Fisheries Program has decided to direct its efforts." Species of concern for the refuge area include: alewife, American eel, American and hickory shad, blue-black herring, striped bass, shortnose and Atlantic sturgeon, and horseshoe and blue crab. Highlights of some of those species follows:

The Federal-listed endangered shortnose sturgeon is an anadromous species and ranges along the Atlantic coast. One of this species' 19 population segments in North America occurs in the Bay. Human impacts, such as bridge construction and demolition, can have adverse effects on swimbladder fish such as the shortnose sturgeon (Litwiler 2001). Other human impacts and biological factors that cause population decline in shortnose sturgeon and conservation actions to protect the species are presented in the MD WDCP (MD DNR 2005).

The Atlantic sturgeon is a candidate for Federal-listing. MD DNR Fisheries Service is working to restore viable, self sustaining populations of this species to the Bay using a combination of closed fishery, removal of barriers to spawning grounds, water quality improvements, and hatchery-produced fish. Information regarding threats and conservation actions for this fish can be found in the Fishery Management Plan for Atlantic Sturgeon by the Atlantic States Marine Fisheries Commission (ASMFC 1990).

The horseshoe crab is an interjurisdictional species known to spawn on the southern tip of the refuge. In June 2009, refuge staff began a tagging program to learn more about the local horseshoe crab population. Biologists from state and federal agencies across the range of this species participate in this cooperative tagging program. Tag return data provides information about horseshoe crab migration patterns, distribution, abundance, and mortality, which informs the management of horseshoe crab populations. Horseshoe crabs present a complex marine resource management issue on the Atlantic coast. They play a vital ecological role in the migration of shorebirds along the entire Atlantic seaboard, as well as providing bait for commercial American eel and conch fisheries along the coast. Additionally, their unique blood is used by the biomedical industry to produce Limulus Amoebocyte Lysate (LAL), an important tool in the detection of contaminants in patients, drugs and other medical supplies. The challenge of fisheries managers is to ensure that horseshoe crabs are managed to meet all these diverse needs, while conserving the resource for its self-perpetuation (ASMFC 2007).

The blue crab is an interjurisdictional species also found in the Chester River. During the winter months, the blue crab occurs in low densities and is distributed along the southern side of the refuge. In the summer, blue crab density is much higher and is distributed along the entire refuge. Spawning for this species occurs during the summer surrounding the refuge.

Strategies
Continue to:

1) Facilitate research by partners' to study interjurisdictional fish and other species, if projects are compatible and support refuge goals and objectives (e.g. horseshoe crab and blue crab spawning in area)

Within 1 year of CCP approval:

2) Initiate discussion with MD DNR about management strategies that will help protect SAV beds, other aquatic habitats, and water quality of the Chesapeake Bay and Chester River

Objective 1.4.2 (Other Fish and Aquatic Species of Concern Protection):

Over the next 15 years, continue to actively participate in partners' efforts to protect and monitor other aquatic species of regional and State concern, including the diamondback terrapin.

Basis of the objective:
The Bay supports an incredibly rich diversity of aquatic life, in addition to the fisheries identified in objective 1.4.1. At least seventy species of fish and numerous shellfish spend a portion of their life cycle in the mesohaline estuaries of the Bay near the refuge, using it for spawning, as juvenile nursery areas, or for foraging. Some species of concern are consistently observed in the waters surrounding the refuge, although generally their numbers are declining. The Atlantic menhaden and American oyster are examples. The menhaden is found in the Chester River; the upper part of the river serves as a nursery area, the area surrounding the refuge provide juvenile habitat, while the lower river serves as an adult concentration area. Menhaden are important prey to many predatory fish and birds, thus forming an important link in the Bay food web. The oyster occurs in the Chester River. It represented the Bay's most valuable commercial fishery until about the 1980s when over-harvesting, dwindling habitat, pollution, and diseases caused severe declines. It filters water for food, improving water clarity and quality conditions for SAV and other species (EPA 2002).

Other aquatic species of concern are only rarely seen, such as the Federal-listed endangered loggerhead and leatherback sea turtles and humpback whale. All have been seen at least once in the eastern Bay area, but not since 1992. While we remain watchful for their presence, they have not been a focus of management.

Diamondback terrapins, however, are of particular interest to us because they use refuge lands and until recently, were an active commercial fishery managed by the MDDNR. Effective July 1, 2007, it became unlawful to take or possess them for commercial purposes and recreational harvest was limited to 3 per person. (Chapters 117 & 118, Acts of 2007; Maryland Code of Natural Resources Article, sec. 4-902).While this legislation was a major step forward for terrapin conservation, we remain concerned about their future. Where feasible, and within our authority and jurisdiction to do so, we are placing emphasis on preserving or expanding well developed sandy beach heads that are the primary nesting areas for terrapins, reducing disturbance during the nesting season, controlling predators of eggs and hatchlings (primarily raccoon, fox and rat) and reducing mortality on roads. In addition, our actions under objectives 1.1.1, 1.1.2 and 1.1.3 to protect and restore shoreline, tidal marsh, and shallow water habitats would contribute to the conservation of terrapins. We will also insure that the terrapin conservation is considered in the design of future erosion abatement measures, especially regarding the effects on nesting beaches for terrapins. For example, proposals for bulkheading and riprapping would cause us concern.

In their wildlife diversity conservation plan, MD DNR proposed 21 different conservation actions to protect these fish and other aquatic species of concern, or restore their habitats. Among the actions most relevant on the refuge are:

1) Reestablish and conserve SAV beds in areas where they formerly occurred and where water quality has improved since their disappearance

2) Initiate measures to protect, maintain, and improve all species habitats and populations through coordinated efforts with various programs, especially the Chesapeake Bay Program

3) Implement BMPs to reduce non-point source impacts and erosion control measures and promote the protection and preservation/restoration of aquatic/riparian communities

4) Maintain buffer zones to block siltation, pesticide, and fertilizer runoff to wetlands and develop regional strategies to reduce and restrict the flow of pesticides and other toxic contaminants into aquatic systems

5) Coordinate conservation efforts between various interest groups and across states boundaries, including state agencies

6) Improve and promote education and public outreach efforts

7) Develop and implement protocols to control invasive species

8) Work with NGOs, including Chesapeake Bay Foundation and the Alliance for the Chesapeake Bay

9) Implement compatible shore-erosion techniques

10) Limit boating activity to protect SAV beds

11) Implement required management actions in approved fishery management plans

We are implementing each of the conservation actions noted above at some level on the refuge. Many of our implementation strategies are described under objectives for protecting and restoring shoreline, tidal marsh, and shallow water habitats. We would continue these actions at their current levels.

Strategies

Continue to:

1) Implement efforts under subgoal 1 to protect shoreline, tidal marsh, and shallow water habitats as discussed under subgoal 1

2) Support partner-led research on diamondback terrapin

3) Establish a monitoring protocol to evaluate the status of sandy beaches which serve as turtle nesting areas, and the impacts from management

4) Evaluate all designs for future erosion abatement measures for their impact on nesting beaches for terrapin

Begin within the next 3 years:

5) Establish a GS-7 Biological Technician position to assist in implementing and monitoring the program (same position as listed under objective 1.1.1)

Within the next 5 years:

6) Evaluate the cause of predation on terrapin eggs; trap individual predators (e.g. foxes) as warranted

SUBGOAL 5: Consistent with the full extent of Service trust responsibilities, protect and restore archeological and historic resources on the refuge.

Rationale for subgoal:

As a Federal land management agency, we are responsible for locating and protecting cultural resources, specifically archeological sites and historic structures eligible for, or listed in, the National Register of Historic Places. Along with certain natural resources, these cultural resources are a Federal trust responsibility. This applies not only to refuge lands, but also on lands affected by refuge activities, and includes any museum properties. There are

numerous recorded archeological sites within the refuge area, and it is likely that additional prehistoric or historic sites may be located in the future. There is also the historic lodge, now used as the refuge headquarters and visitor facility, which is eligible for listing on the National Register.

Objective 1.5.1 (Archeological Resource Protection):

Over the next 15 years, preserve archaeological resources on the refuge from destruction by coastal erosion or artifact looting.

Basis of the objective:
We describe our measures to curtail shoreline erosion under goal 1, subgoal 1, objective 1.1.1. Those actions will also help to reduce the loss of archeological resources caused by erosion.

Service initiated actions likely to affect archaeological and historic sites are routinely reviewed and assessed under the provisions of Sec. 106 of the National Historic Preservation Act. To date, projects requiring such review on the refuge have been confined to the architectural rehabilitation of the headquarters lodge structure, siting of facilities and moist soil management units, so refuge lands have never had a systematic archaeological survey in their entirety.

We suspect prehistoric archaeological sites on the refuge have been severely damaged by erosion, and some have probably vanished into the Chester River and Bay. Archaeologists in the State Historic Preservation Offices (SHPO), as well as in universities, museums, and consulting firms working in the Bay area agree that erosion is a significant threat to coastal archaeological sites in the state. Accelerated erosion is occurring all around the island. Shoreline protection efforts we plan under goal 1 will also serve cultural resource protection; however, these restoration plans often take years to implement and serve their purpose. If a concerted effort is not undertaken soon to locate, monitor, and assess archeological sites for listing in the National Register of Historic Places, and preserve or conduct archaeological excavation of them, a major piece of the region's prehistory and early history will be lost forever.

Looting of artifacts from shoreline eroding sites, and in newly cultivated fields on the refuge is well-documented but, fortunately, incidences have decreased in recent years. Regular law enforcement of these areas is critical to insure vandalism does not continue at the historically high rates. Unfortunately, law enforcement capabilities are limited on the refuge. Also, no staff members have attended the Federal Law Enforcement Training Center's Archaeological Resources Protection Act (ARPA) course. This hinders our ability to investigate looting violations. On the other hand, we strive to accomplish protection of cultural resources through partnerships in public education and monitoring with agencies and communities that have an interest in refuge lands and resources.

Strategies
Continue to:

1) Consult with the Maryland SHPO regarding Refuge undertakings that have potential to affect archaeological resources

2) Perform archaeological reviews, surveys, or studies of project areas as needed or recommended by the Service's Regional Archeologist

3) Raise awareness of the importance of protecting cultural resources through outreach and interpretive information and programs

4) Continue to maintain and store all museum property housed at the refuge

5) Ensure that museum properties housed at the refuge are stored to Federal preservation standards

Begin within 5 years of CCP approval:

6) Work with Maryland Archeological Society and other state, county and professional archeological societies willing to assist in performing surface surveys of selected refuge shoreline to locate archaeological resources at risk from coastal erosion or artifact looting. Develop site management and protection plans as warranted.

7) Establish a GS-9 Park Ranger/Law enforcement position to conduct outreach and enforce regulations to protect these resources; ensure that this position or another refuge complex law enforcement person receives ARPA training

8) Establish an agreement with Maryland DNR, other state agencies with law enforcement capabilities, and Kent County Sheriff's Department, all of whom have some jurisdiction on the Bay and shoreline, to assist in protecting cultural resources

9) Develop a prioritized program to perform additional surveys as funding allows; including a systematic program to monitor erosion and looting of known sites, as well as maintain historic structures on the Refuge. Also, conduct an Archeological Resources overview to identify areas with a high probability of containing archaeological sites. Consult with the Maryland Historic Preservation Office in developing priorities.

10) Facilitate research on the refuge that helps achieve cultural resource protection and conservation objectives

11) Include ARPA message in appropriate refuge brochures and information sites, including those produced by partners

Objective 1.5.2 (Protection of Historical Structures):

Within 5 years of CCP approval, establish an annual program of maintenance on all refuge structures which are eligible for the National Historic Preservation Register to ensure we meet the Department of the Interior's historic preservation standards.

Basis of the objective:
The National Historic Preservation Act considers deterioration of historic structures as an adverse effect upon them. The only known historic structure that is currently determined eligible for the National Historic Register is the headquarters lodge. This lodge was extensively renovated to Department of Interior historic preservation standards over the period 2000-2006, but some repairs are still needed. A field review by the Regional Facilities Coordinator documented a list of additional maintenance needs. Completing these repairs, and establishing a regular program of maintenance, will be essential to protect the structure from further deterioration. This structure is perceived by the public, preservation advocates, and historians as an important resource in Kent County, and its preservation is a Federal trust responsibility for the Service.

There is at least one other structure on the refuge, the former hunt club lands caretaker's house, that may have potential for the National Historic Register, but it has not been fully evaluated yet.

While most of the refuge's museum properties are housed at the Maryland Archeological Conservation Laboratory, there are several properties located at refuge headquarters that would be maintained to Federal preservation standards.

Strategies
Continue to:

1) Consult with the Maryland SHPO regarding refuge undertakings that have the potential to affect historic resources

2) Work with the Friends of Eastern Neck to seek alternative funding sources, develop political and public support for maintenance of the lodge and other cultural resources, and pursue additional partnerships to accomplish priority needs

Within 5 years of CCP approval:

3) Complete all major maintenance identified in the 2007 field review/inventory of the lodge (Ortyl 2007), and develop an annual maintenance plan to insure the integrity of the building is sustained

4) Work with the Maryland Archeological Conservation Lab (MACL) to develop and conserve refuge exhibits and other artifacts located in the lodge

5) Establish a full-time GS-9 Park Ranger/Law enforcement position (same position as identified under objective 1.5.1) to conduct outreach and enforce regulations to protect these resources; ensure that this position or another refuge complex law enforcement person receives ARPA training

GOAL 2 Maintain a healthy and diverse complex of natural community types comprised of native plants and animals to pass on to future generations of Americans

Rationale for goal:
Eastern Neck Refuge supports a wide diversity of habitats, with brackish tidal marshes, natural ponds and impoundments, upland forests, hedgerows, and grasslands, and a variety of managed rotational croplands. In addition to the waterfowl and bald eagles mentioned in goal 1, these habitats support a broad array of breeding and migrating songbirds and other wildlife. It is a stopping over point for migrating monarch butterflies and also sustains many other species of breeding butterflies and other insects and invertebrates. Our challenge is to use our available resources as effectively as possible to deal with invasive plants and animals, optimize the mix of habitat types, and accommodate compatible wildlife-dependent public uses. Our goal is to manage these habitats to sustain a diversity of native species for the long term and to minimize invasive species.

SUBGOAL 1: Protect, enhance, and restore the natural diversity, integrity and health of community types and associated native plants and animals, and sensitive species on the refuge.

Rationale for subgoal:
The 1997 Refuge Improvement Act establishes that wildlife conservation is the singular Refuge System mission. Biological integrity, diversity and environmental health are critical components of wildlife conservation. Refuge System policy (601 FW 3) provides guidance for maintaining, and restoring where appropriate, those values on refuges. According to this policy, “the highest measure of biological integrity, diversity, and environmental health is viewed as those intact and self-sustaining habitats and wildlife populations that existed during historic conditions.” “Historic conditions” is meant to be a frame of reference, which will vary across the country, but is meant to suggest a time period prior to when the landscape went through major land use change and settlement. The policy makes a point that “No landscape retains absolute biological integrity, diversity, and environmental health.”

Biological integrity can be evaluated by examining the extent to which biological composition, structure, and function has been altered from historic conditions. The emphasis on biological diversity is on maintaining and/or restoring native species and natural communities such as those found under historic conditions. We are striving to maximize the size of habitat blocks to maintain connectivity between habitat blocks, unless there is an overriding reason not to do so. We evaluate environmental health by examining the extent to which environmental composition, structure, and function have been altered from historic conditions.

The policy instructs refuge managers to consider their refuge's contribution to biological integrity, diversity and environmental health at multiple scales. However, at a minimum, the priority is to maintain existing levels of those values at the refuge scale. Secondarily, a refuge manager is guided to restore lost or severely degraded elements of integrity, diversity, health at the refuge scale, and other appropriate scales where it is feasible and supports achievement of refuge purposes and the Refuge System mission. One of the most important actions for us to undertake related to this objective is an inventory of resources and their condition.

Objective 2.1.1 (Maintain Ecological Integrity):

Within 5 years of CCP approval, insure the ecological integrity of refuge lands is maintained as measured through an effective inventory, monitoring, and assessment program.

Basis of the objective:
Service policy on maintaining biological integrity, diversity and environmental health on refuges (601 FW 3) specifies that refuge managers are tasked with assessing the current status of diversity, integrity and health on their refuges through baseline vegetation and population surveys and studies, and comparing those current conditions to historic conditions. The goal of the policy is to prevent additional degradation of environmental conditions and restore lost or severely degraded environmental components. We have some surveys and studies in place that will help with that evaluation, and many have been done in the past, but we have not determined in a comprehensive way what additional information is needed to formulate our baseline of current conditions and assess future conditions. Establishing what additional data is needed, prioritizing that list, and implementing a program to insure that we can evaluate current and future ecological integrity on the refuge is the fundamental purpose of this objective.

Strategies
Continue to:

1) Support partners' efforts to assess the current status of diversity, integrity, and health on the refuge, e.g. the beach beetle study with the Smithsonian Institute

2) Maintain a GIS database for storing data such as vegetation and habitat types, unique habitat components, and wildlife information; update on at least an annual basis, or as frequently as new information warrants

Begin within 5 years of CCP approval:

3) Prioritize a list of baseline inventory and monitoring needs that would help assess ecological integrity, many of which are identified under other objectives; focus on such things as invasive pests and plants, amount and distribution of native vegetation, SAV beds and tidal marsh, water quality, and shoreline integrity. Also, determining which ecological processes had the greatest influences historically and whether they should be restored at some level may also be considered. Wildlife impacts and responses to any manipulations should be included as well.

4) Develop protocols for collecting the information if there are not regional protocols already established. Also, consider a combination of individual metrics from those protocols that could also be combined to best determine an overall ecological integrity value for the refuge. This value could be measured over time to help assess whether management is maintaining, reducing or improving ecological integrity.

5) Pursue opportunities to have partners or volunteers complete or assist in inventories and monitoring

Objective 2.1.2 (Research Partnerships):

Over the next 15 years, foster relationships with researchers who will study critical refuge research needs, including those related to assessing diversity, integrity, and health.

Basis of the objective:
Fortunately for us, the refuge is sought after as a place to conduct research on undeveloped and restored Bay environments. During public scoping, we heard from several individuals who have conducted research and indicated the refuge serves as a great living biological laboratory.

We have obtained valuable refuge information through these research partnerships. This has particularly benefited us as we have not had the staff or funding to accomplish this work on our own. Some of those partnerships include Smithsonian Institute, who studied shore-inhabiting tiger beetles and other *Coleoptera*. We would continue these partnerships and encourage new ones to enhance our ability to achieve our goals and objectives, and to monitor the effectiveness of our actions. Our objectives under goals 1 and 2 identify many specific inventory and research projects that we hope to pursue in the near future.

Strategies
Continue to:

1) Support partner's research on biodiversity (e.g. Smithsonian Institute's research on restored sand beaches and beetle activity)

2) Encourage volunteers and partners to conduct inventories and research that help achieve refuge goals and objectives

Begin within 5 years of CCP approval:

3) In cooperation with state agency and conservation partners, identify the highest priority research and inventory needs for the refuge

4) Work with researchers to identify research goals, study design and methodology and opportunities for alternative sources of funding

Objective 2.1.3 (Invasive Plant Control):

Over the next 15 years, control invasive plants on the refuge, treating at least 50 acres a year, to ensure that less than 25% of refuge lands are dominated (75% cover) by an invasive species.

Jonathan Priday/USFWS

Refuge volunteer mapping invasive species

Basis of the objective:
Controlling invasive, exotic species is a major consideration in managing for native diversity, integrity and health in the Refuge System. According to policy, refuge managers are to prevent the introduction of those species, detect and control them if encountered, and provide for the restoration of native species and habitats in invaded areas. Integrated pest management strategies that incorporate the most effective combination of mechanical, chemical, biological and cultural controls are recognized as important tools (refer to 601 FW 3).

Common reed or *Phragmites* is a familiar sight in most wetland areas along the East Coast. Its ability to tolerate a range of conditions associated with polluted areas has allowed it rapidly to colonize new areas over the last few decades. *Phragmites* spreads by seed dispersion; it produces seeds in great abundance. It also spreads through the reproduction of its root system. The roots grow laterally, creating dense, thick mats. *Phragmites* stands are a problem because they dominate wetlands, reducing wetland diversity, provide little to no shelter for resident wildlife, and the dense roots can alter the hydrology of wetlands by trapping sediments, causing a drying effect. (CBP 2008)

Phragmites can be controlled using a variety of chemical and harvesting methods. Chemical treatments include spraying and using wipe-on herbicide (wicking), but these methods cannot guarantee complete eradication. Other methods of controlling *Phragmites* include dredging, seasonal mowing, the use of plastic barriers and burning. Controlled burning is a quick and efficient method that reduces biomass and increases soil nutrients. Often a combination of methods will yield the best results. (CBP 2008).

Our highest priorities on the refuge for invasive plant control or eradication would continue to be *Phragmites*, mile-a-minute, Johnsongrass, and Canada thistle. However, we have numerous other species that are pervasive across the refuge and that we will target for control because of our concern with decreasing biodiversity and competition with native vegetation. Because there are so many species to address, invasive plant control has become a major problem and will require a massive effort to control on this refuge. Our most recent Integrated Pest Management Plan (2007) identifies our management strategies to be implemented in the near term.

We will continue and expand on our aggressive campaign to control or eliminate invasive plants

Strategies
Continue to:

1) Employ the following methods to control invasive plants in accordance with our 2007 integrated pest management plan:
   —Herbicides
   —Biological control agents
   —Mechanical-mowing
   —Prescribed fire

2) Monitor management activities through photo points, vegetation plots and general observations.

Begin within 3 years of CCP approval

3) Develop a prioritized list of treatment areas, elevating those with the highest wildlife resource values in locations with high public use. The GS-7 Biological Technician position identified in objective 1.1.1 and elsewhere would be key to implementing any increase in mechanical treatments for invasive species

4) Ensure acres treated, their location, and other relevant data is included in GIS database and updated each year

SUBGOAL 2: Protect the integrity of Federal-designated Research and Public Use Natural Areas

Rationale for subgoal:
The Service administratively designates research natural areas (RNAs) and Public Use Natural Areas (PUNAs) on refuges. Currently there are 210 RNAs

across the Refuge System, including 1,955,762 acres. RNAs are part of a national network of reserved areas under various Federal land ownerships. Other Federal land management agencies also have designated RNAs. They are intended to represent the full array of North American ecosystems with their biological communities, habitats, natural phenomena, and geological and hydrological formations.

In RNAs, as in designated wilderness, natural processes are allowed to predominate without human intervention. Under certain circumstances, deliberate manipulation may be used to maintain the unique features for which the research natural area was established. Research and educational opportunities for scientists and others should be encouraged in RNAs to contribute to our understanding of the environment.

Activities such as hiking, bird watching, hunting, fishing, wildlife observation, and photography are permissible, but not mandated, in research natural areas. RNAs may be closed to all public use if such use is determined to be incompatible with primary refuge purposes *(http://www.fws.gov/refuges/habitats/specialAreas.html).*

PUNAs are a separate designation used only by the Service and the Refuge System. The network of PUNAs across the country were established to ensure the preservation of a variety of significant natural areas for public use with certain restrictions and which, when considered together, illustrate the diversity of the Refuge System natural environments, and preserve these environments as essentially unmodified by human activity for future use. The capability of the area to possess "…exceptional value or quality in illustrating or interpreting an element of the natural heritage of our Nation" is an important consideration (Refuge Manual 8 RM 11.1). This criterion is also an important distinction between RNAs and PUNAs.

Scientific research is also encouraged in PUNAs, as is non-research educational use. Recreational activities should be limited to only those that are compatible with the maintenance of resource integrity and significance.

Objective 2.2.1 (Hail Point Research Natural Area):

Over the next 15 years, protect and restore the Hail Point Marsh and Peninsula Research Natural Area to insure it continues to meet the criteria and ecological values for which it was established.

Basis of the objective:
In 1975, the Service designated the 149-acre tidal salt marsh at Hail Point as a RNA because it was considered a relatively undisturbed, naturally-functioning intact tidal marsh and because it contained an unusual plant association, a 20-acre loblolly pine-American holly forest. In addition, at the time it was designated, there was a 50 nest great blue heron colony and an osprey nest site.

This RNA is located in the most isolated portion of the refuge and thereby minimally affected by human factors, except for occasional boaters traveling around the southern end of the refuge. This area is also known as a monarch butterfly staging area where the butterflies can be observed resting in their fall migration before attempting their flight across the Chesapeake Bay.

This area of the refuge is experiencing significant erosion from the Chester River-side. In addition to installing breakwaters to protect the RNA as described under goal 1, objective 1.1.1, we will continue to prohibit public access to the shoreline to ensure that no other activities threaten the site's integrity.

Strategies
Continue to:
1) Routinely monitor public uses in nearby parts of the refuge and note any signs of unauthorized access or uses from the land or water side

Begin within 5 years of CCP approval:
2) Determine what ecological criteria should be monitored and set up a program

3) Maintain monitoring results in GIS database

Objective 2.2.2 (Tubby Cove-Calfpasture Cove Public Use Natural Area): Over the next 15 years, manage the Public Use Natural Area in the Tubby Cove-Calfpasture Cove area to ensure it continues to meet the criteria and ecological, educational and interpretive values for which it was established.

Basis of the objective:
In 1975, the Service established the Tubby Cove-Calfpasture Cove area as a Public Use Natural Area because it provided a relatively undisturbed natural setting that was accessible to the public, and affords exceptional educational and interpretive opportunities. The established trail allows people to view wildlife and marsh habitat, while minimizing impacts to resources by requiring people to stay on the trail and in the viewing area/platform.

Strategies
Continue to:
1) Routinely monitor public uses in the PUNA and note any signs of unauthorized off-trail use or access from the land or water

Begin within 5 years of CCP approval:
2) Determine what establishment criteria should be monitored and set up a program

3) Maintain monitoring results in GIS database

GOAL 3

Conduct effective outreach activities and develop and implement quality, wildlife-dependent public use programs, with an emphasis on wildlife observation and photography, to raise public awareness of the refuge and the Refuge System, and promote enjoyment and stewardship of natural resources in the Chesapeake Bay region.

Rationale for goal:
Our desire is to be a recognized, welcomed, and valued part of the Eastern Shore community. Our concern is that we are not well known in the Kent County area. Raising the visibility of the Service, the NWRS, and the refuge will encourage people to learn about the importance of refuge habitats and species of concern, and the refuge's role in conserving Bay resources. An effective outreach program will enhance support for our programs and allow us to proactively anticipate and deal with public issues if they arise.

Hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation are the six priority wildlife-dependent public uses identified in the Refuge Improvement Act. The Act stipulates those six uses are to receive enhanced consideration in refuge planning, but does not establish a hierarchy among those six uses. Opportunities to engage in them should be provided to the extent compatible with specific refuge goals and objectives. The ability to fund the management of these activities is also a factor for refuge managers to consider in determining their compatibility. Service policy requires that refuge managers set limits on, and establish stipulations for, any of those

activities as warranted to ensure their compatibility. Each of these activities is already facilitated on current refuge lands.

An analysis in 2006 conducted by the Northeast Region's Visitor Services' team recommended that we focus on wildlife observation and wildlife photography opportunities on this refuge. Our goal is to improve current opportunities for those programs as a priority, and enhance other compatible programs to the extent feasible, through expanded programs, new infrastructure or improved access.

SUBGOAL 1: Enhance and increase effective public outreach activities to increase the visibility of the Service, the refuge, and the Refuge System and to garner increased appreciation and support for our conservation activities.

Rationale for subgoal:
A well-rounded and active program of public outreach raises the visibility of the Service and the Refuge System, and enables large segments of the public to learn about the importance of refuge habitats, species of conservation concern, cultural resources, refuge management, and the refuge's role in conserving the Chesapeake Bay ecosystem. An effective public outreach program will help us gain support for our programs and allow us to proactively deal with controversial refuge management activities. This program can be used to anticipate and avoid potential conflicts between the needs of wildlife and other refuge uses.

Objective 3.1.1 (Community Outreach):

Within three years of CCP approval, more than 50 percent of the adults contacted within Kent County will understand the importance of conserving habitat on Eastern Neck Island, will know that the refuge is part of a national system of wildlife refuges, be aware of the wildlife-dependent recreational opportunities available on the refuge, and plan to visit the refuge or actively participate in refuge programs or volunteer projects within the next year.

Basis for the objective:
In order to build a stronger base of public understanding, support, and activism beyond that portion of the American public who visit refuges, the Service has actively supported nationwide strategies, partnerships, legislation, and departmental mandates with a strong emphasis on outreach. These include the 100-On-100 Outreach Campaign, the National Outreach Strategy: A Master Plan for Communicating in the U.S. Fish and Wildlife Service, the Cooperative Alliance for Refuge Enhancement (CARE), the Volunteer and Community Partnership Act, and the Challenge Cost-Share Program.

We are particularly interested in outreach to the local communities in Kent County. Our desire is to be a welcomed and valued asset to those communities. A positive community relationship is a crucial link between public support for refuges and effective management of the Refuge System. We are aware that there are many residents who either do not know that a National Wildlife Refuge is nearby, or do not recognize its regional importance to the Chesapeake Bay ecosystem.

We are striving for a well-rounded program of public outreach to enable large and diverse segments of the public to learn about the importance of refuge wetland and upland habitats, species of conservation concern, cultural resources, refuge management, and the refuge's role in the Refuge System. An effective public outreach program can also help win friends and proactively deal with controversial refuge management activities. This program can be used to anticipate and avoid potential conflicts between the needs of wildlife and other refuge uses.

We believe that regular communications within the community is very important. News articles and personal appearances inform our neighbors about what we are doing and why, which will hopefully lead to increased understanding, appreciation, and support of our programs. Feedback we receive from these outreach efforts allows us to better understand issues that are important in our communities, and how our management may affect them.

We also believe that actively engaging people in meaningful refuge programs or projects will make a more lasting impression. We offer many opportunities for people to get involved. Partners, volunteers and members of the Friends of Eastern Neck are vital to accomplishing our outreach activities. They assist us in community events and refuge visitor programs as well as support data gathering, maintenance projects, and staffing a visitor contact station. This assistance support us in meeting the refuge's goals and objectives, supports the missions of the Refuge System and the Service, and fosters good community relationships.

Strategies
Continue to:

1) Issue news releases to local and regional print and electronic media when newsworthy events occur, to announce scheduled activities, and to keep the public informed about refuge management activities

2) Routinely respond to written, telephone, and in-person inquiries from the public

3) Use staff and volunteers to participate in display exhibits at special events on Maryland's Eastern Shore

4) Distribute to the public our current leaflets, consisting of a general brochure, bird list, interpretive leaflet for hiking trails and recreation areas and deer hunt information and map

5) Maintain and regularly update contact information for partners, elected officials, the media, and the public

6) Work towards more informed and productive relationships with the local media; establish personal contacts at all media outlets

7) Inform refuge neighbors of refuge management activities via the website, press stories, and letters

8) Promote our successes in the local community via refuge and community events, project demonstrations, and press stories

9) Use Friends of Eastern Neck members to assist in staffing the Refuge Visitor Contact Station while providing coverage at the Friends of Eastern Neck Book Store seven days a week These hours would continue to provide visitors an opportunity to have questions answered, obtain various brochures, view various exhibits and make purchases

10) Partner with the Kent County Bird Club to use the refuge as a site for their various birding programs

11) Encourage use of the conference room/auditorium to conservation and/or educational organizations to conduct meetings and workshops

12) Support the Friends Group's participation in local community events, such as the Chestertown Tea Party, Chestertown Wildlife Exposition and Rock Hall Fall Festival

13) Utilize volunteers to participate in other community events in Kent County where effective outreach of refuge programs can occur; work with Kent County Tourism, Rock Hall Visitor Center, and other community organizations in conservation-related events and activities as they are being developed

14) Develop and implement annual volunteer recruitment, training, and appreciation/recognition events

Begin within 5 years of CCP approval:

15) Upgrade the visitor services specialist position to a GS-9 to reflect the increased complexity associated with developing and coordinating program plans and partnerships. This position will also allow us to accomplish all of the visitor services objectives and strategies, and to:
    a) Determine the most efficient ways to conduct outreach
    b) Develop a Visitor Services Plan to strategically create, enhance, implement, and evaluate our visitor services opportunities
    c) Develop and implement procedures to offer refuge "behind the scenes" tours to the media, elected officials, and the general public
    d) Develop and implement a video/DVD about the CM Refuge Complex
    e) Initiate outreach to local kayak and canoe rental facilities to promote the new water trail and limit trespass and related problems at the refuges

16) Create and maintain refuge-specific fact sheets

17) Expand refuge outreach programs to include recognized events such as, but not limited to, International Migratory Bird Day, National Wildlife Refuge Week, Earth Day, and National Boating and Fishing Week designed to promote wildlife-dependent recreation and natural resource education. The program should capitalize on the refuge's proximity to the Baltimore, Philadelphia and Eastern Shore towns.

Objective 3.1.2 (Other Agencies and Partner Outreach):

Over the next 15 years, continue to foster and enhance cooperation and communication with other state and Federal agencies, museums, civic organizations, environmental and conservation groups to promote and advance the Refuge System mission and refuge goals.

Basis for the objective:
Besides the Friends of Eastern Neck and our volunteers, we have many other partners who help us conduct outreach within professional, academic, non-governmental organizations, and government agency arenas. This is generally achieved through means such as professional or agency meetings and presentations, publications, and refuge tours. We identify many of these partners in goals 1 and 2.

These partners include several government and local agencies active in the refuge area who share in the responsibility to conserve natural resources. Among them are the U.S. Army Corps of Engineers, U.S. EPA, USDA - NRCS, MD DNR, planning district commissions, historical preservation commissions, soil and water conservation district commissions, chambers of commerce, Kent County government, and others. We plan to continue to work closely with these entities to achieve mutual outreach objectives.

We also plan to continue our collaborations with educational and research institutions to facilitate their research and investigations that help us seek answers to important natural resource issues on the refuge and within the refuge system and to contribute our basic understanding of important natural resource issues worldwide. The Smithsonian Institute, National Aquarium in Baltimore,

and several area universities are examples of our current educational and research partners.

Encouraging relationships with non-governmental conservation organizations active in the Chesapeake Bay region will also be important in our overall outreach strategies. The Chesapeake Bay Foundation, Gateways Network members, Alliance for the Chesapeake Bay, Ducks Unlimited, and the Easton Waterfowl Festival are examples.

Strategies

Continue to:

1) Maintain regular contact with private, state, local, and other Federal agencies, environmental groups, congressional offices, and other interested parties

Begin within 5 years of CCP approval:

2) Upgrade the visitor services specialist position to a GS-9 to reflect the increased complexity associated with developing and coordinating program plans and partnerships. This position will also allow us to accomplish all of the visitor services objectives and strategies, and to:

    a) Review existing partner relationships to determine if outreach, or the dissemination of information, could be more effective; facilitate the publication of refuge research results written for non-scientific audiences to the extent possible
    b) Evaluate all existing or planned partnerships to identify those that will benefit from formal MOUs/MOAs or cooperative agreements. This will help identify mutual goals, cost sharing, technical exchange, and environmental education and interpretation opportunities
    c) Work with partners to highlight work and successes; use media links (e.g., websites)

SUBGOAL 2: Ensure that visitors are satisfied with the safety, accessibility, and quality of opportunities to observe and photograph wildlife on the refuge.

Rationale for subgoal:

While our primary mission is to protect wildlife and promote wildlife conservation, the 1997 Refuge Improvement Act directs us to provide six priority wildlife-dependent recreational uses in the Refuge System: hunting, fishing, wildlife observation and photography, and environmental education and interpretation where it is compatible. By providing the public with safe, accessible quality opportunities and well-maintained facilities for those uses, we hope to raise public awareness, understanding, appreciation and stewardship of the Chesapeake Bay ecosystem and the benefits of its conservation for fish, wildlife, and people. Ultimately, these will contribute to the mission of the refuge and the Refuge System.

Region 5 National Wildlife Refuge visitor service's specialists and management staff conducted an assessment in 2006 and established which two priority public use programs should be emphasized on individual refuges. Wildlife observation and photography were selected for this refuge. The determination was based on careful consideration of our natural resources, existing staff, operational funds, existing and potential facilities, and which programs we would be most effective in providing "quality" opportunities for visitors. While all priority public uses are important and offered to some degree on the refuge, wildlife observation and photography programs will receive greater emphasis when prioritizing refuge complex resources. In chapter 3 we describe in detail the facilities and programs we offer to support wildlife observation and photography. As always, we look to our partners, Friends Group, and volunteers to assist with our public

use programs. We will provide these opportunities in ways that do not adversely impact wildlife resources.

Objective 3.2.1 (Wildlife Observation and Photography):

Within 5 years of CCP approval, at least 90 percent of all upgrades of existing trails, observation platforms and blinds, would be completed to provide visitors with quality opportunities for wildlife observation and photography.

Basis of the Objective:
Wildlife observation and hiking constitute the majority of use on the refuge throughout the year. Over 55,000 people visit the refuge each year, and based on our informal monitoring, most come to the refuge to view and photograph wildlife. Maintaining quality infrastructure, and providing some new facilities, would enhance visitor opportunities to view the relationships among resource management, wildlife, habitat and people. Our facilities for public visitation include parking, restrooms, information kiosks, nature trails, photo blinds, boardwalks and interpretive literature/signs. Most of our facilities are open year round. The only exception is Ingleside Recreation Area and its access road, which would remain closed to visitors from October 1 to March 31 to protect wintering waterfowl.

We recognize a few shortcomings with our current program. A few trails are in need of upgrading. There is no parking for hikers at the Boxes Point Trail. This causes conflict with vehicles and pedestrians in that area. Benches are present on some trails which provide a resting spot for hikers; however, providing benches on all trails would enable hikers to sit quietly and enjoy the beauty around them. Trespassing and littering on the refuge has been increasing in recent years. These activities adversely affect wildlife and their habitat and can pose a threat to public safety. Our limited outreach and enforcement capabilities exacerbate this problem.

We will also strive to meet these guiding principles for refuge wildlife observation and photography programs identified in Service policy (605 FW 4 & 5):

- Provide safe, enjoyable, and accessible wildlife viewing and photography opportunities and facilities;
- Promote visitor understanding of, and increase visitor appreciation for, America's natural resources;
- Provide opportunities for quality recreational and educational experiences consistent with criteria describing quality found in 605 FW 1.6; and,
- Minimize conflicts with visitors participating in other compatible wildlife-dependent recreation activities.

We would continue to work with partners, and seek new ones, that facilitate quality wildlife observation and photography opportunities. For example, the public birding programs that have been offered by the Kent County Bird Club have met with great success and large attendance.

Strategies
Continue to:

1) Maintain the following wildlife observation facilities:
   a) Visitor Contact Station at Refuge Headquarters with access to Tidal Marsh Trail and observation blind
   b) Tundra Swan Boardwalk with two viewing scopes
   c) Bayview Butterfly observation platform with two viewing scopes
   d) Bayview Trail with observation blind

e) Wildlife Trail with observation blind
f) Duck Inn Trail
g) Boxes Point Trail
h) Ingleside Recreation Area
i) Bogles Wharf
j) Tubby Cove boardwalk with observation blind and platform
k) Wickes historic site and marker

2) Allow guided bird walks performed by the Kent County Bird Club providing observation opportunities and techniques for visitors

3) Allow volunteers to install and maintain osprey platforms, wood duck nesting boxes, and tree swallow and bluebird houses in areas where the public may observe wildlife activity. Only implement if there is a long-term commitment by volunteers to manage program.

4) Encourage wildlife observation by canoe and kayak around the perimeter of the island except in areas seasonally closed to protect sensitive wildlife. Water trail maps would continue to be available for purchase at the Friends of Eastern Neck book store.

5) Provide for sale, through The Friends of Eastern Neck, a water trail guide

Begin within 1 year of CCP approval:

6) Formalize partnerships with environmental organizations, including Kent County Bird Club, who provide birding programs at the refuge

7) Initiate discussion with MD DNR about management strategies to minimize activities that disturb resting and feeding waterfowl, bald eagles, or impact marsh vegetation

8) Work closely with canoe and kayaking groups to reduce winter disturbance

9) Initiate the following:
   a) Improve the Bayview Butterfly Trail.
   b) Improve the spur trail off the Wildlife Trail that leads to an observation blind.
   c) Evaluate need and opportunity for parking area at Boxes Point Trailhead

Begin within 5 years of CCP approval:

10) Upgrade the visitor services specialist position to a GS-9 (same position as identified under objective 3.1.1) to reflect the increased complexity associated with developing and coordinating program plans and partnerships. This position will also allow us to accomplish all of the visitor services objectives and strategies, and to:
    a) Develop a Visitor Services Plan for the refuge and
    b) More strategically plan, implement and monitor our wildlife observation and photography programs
    c) Hire and supervise Visitor Services' interns to help accomplish program objectives

11) Establish a GS-9 Park Ranger/Law enforcement position (same position as identified under objective 1.5.1) to conduct outreach and enforce regulations that allow for a quality program

SUBGOAL 3: Provide opportunities for quality, recreational fishing and hunting.

Rationale for subgoal:
Hunting and fishing are two of the six priority wildlife-dependent public uses for the National Wildlife Refuge System. We provide opportunities for both activities on the refuge. We believe we are offering quality programs that meet public demand and our wildlife and habitat goals, and do not detract from our visitor service's management program emphases on wildlife observation and photography.

Objective 3.3.1 (Recreational Fishing and Crabbing):

Over the next 15 years, provide quality recreational fishing and crabbing access at the Entrance Bridge, Tundra Swan Boardwalk, Boxes Point Trail, Duck Inn Trail, Bogles Wharf, and Ingleside Recreation Area, and annually, provide a quality youth fishing event for approximately 75 youth anglers at the Headquarters Pond.

Basis of the objective:
The Service does not have jurisdiction over the shallow and deep waters surrounding the island and therefore we do not regulate fishing or other water-based activities within the navigable waters of the State, or within areas where water bottoms are State-owned. However, we do provide access to these activities from refuge lands, and conduct enforcement of rules and regulations at the areas.

Fishing and crabbing have been historical, consumptive recreational uses on the refuge that we believe are compatible with our resource objectives. Approximately 1,500 anglers use the refuge to access fishing areas each year; however, this number tends to fluctuate with the quality and availability of crabbing.

We will strive to meet these guiding principles for a refuge recreational fishing program identified in Service policy (605 FW3 and 4):

- Effectively maintain healthy and diverse fish communities and aquatic ecosystems through the use of scientific management techniques;
- Promote visitor understanding of and increase visitor appreciation for America's natural resources;
- Provide opportunities for quality recreational and educational experiences consistent with criteria describing quality as defined in 605 FW 1.6;
- Encourage participation in this tradition deeply rooted in America's natural heritage and conservation history; and,
- Minimize conflicts with visitors participating in other compatible wildlife-dependent activities.

Strategies
Continue to:

1) Permit access for fishing and crabbing from the Entrance Bridge, Tundra Swan Boardwalk, Boxes Point Trail, Duck Inn Trail, Ingleside Recreation Area, and Bogle's Wharf. Ingleside Recreation Area would continue to be open only from April 1 through September 30. No refuge permit is required.

2) Prohibit fishing in refuge ponds, pools, impoundments, and wetlands to prevent disturbance to wildlife and habitat. The only exception is the annual, one-day Youth Fishing Derby at the Headquarters' Pond.

Begin within 5 years of CCP approval:

3) Establish designated shoreline and boat fishing access locations in areas where resource damage is a concern

4) Some sites may be closed periodically to reduce resource damage, or minimize conflicts with other habitat management activities. Notification of closures would be posted on the refuge website, announced in the local paper, on signs located at the refuge entrance, and parking areas at least 48 hours prior to its closure.

5) Provide visitors with general information on the fishing program and refuge specific rules and regulations through the refuge website, informational signs at parking areas, trailheads, the refuge entrance road, and at refuge headquarters

6) Provide monofilament line-disposal units at all fishing access areas

7) Establish a GS-9 Park Ranger/Law enforcement position (same position as identified under objective 1.5.1) to conduct outreach and enforce regulations that allow for a quality program

Objective 3.3.2 (Deer Hunting):

Within 3 years of CCP approval, more than 80% of the hunters who are contacted claim to have had a quality white-tailed deer hunt experience on the refuge.

Basis of the objective:
Hunting on the Eastern Shore is a traditional outdoor past time, and is deeply rooted in our American heritage. A quality hunt program helps develop an appreciation for fish and wildlife. It is also a tool to assist in deer population control and habitat management efforts on the refuge.

Opportunities for public hunting are decreasing with increasing private land development. Refuge lands thus become increasing important in the region as a place to engage in this activity.

We will strive to meet the following guiding principles for a refuge hunting program identified in new Service policy (605 FW 2):

- Manage wildlife populations consistent with Refuge System-specific management plans approved after 1997 and, to the extent practicable, State fish and wildlife conservation plans;
- Promote visitor understanding of and increase visitor appreciation for America's natural resources;
- Provide opportunities for quality recreational and educational experiences;
- Encourage participation in this tradition; and,
- Minimize conflicts with visitors participating in other compatible wildlife-dependent recreational activities.

The refuge hunt program is implemented consistent with state regulations and additional refuge regulations stipulated in 50 CFR. Our deer hunt area map is depicted in chapter 3, map 3.7. Included in our hunt plan objectives is the intent to maintain the deer population at a level commensurate with available habitat, in order to maintain the health of the herd and prevent habitat degradation that accompanies overpopulation. Our current program is a seven-day hunt. In general, we believe the extent of our current program meets the needs of our public and provides a quality experience. However, we will continue to evaluate

the program on an annual basis and modify it, as warranted, given new biological or visitor data.

Strategies
Continue to:

1) Permit white-tailed deer hunting for: two days of muzzleloading rifle; two days of shotgun; one day of archery hunting; one day of non-ambulatory hunting; and, one day of youth hunting

2) Provide this opportunity to a maximum of 650 hunters each year (100 adult hunters per adult hunt day, and approximately 50 youth hunters). A fee would continue to be required to apply for a permit. Senior citizens receive a 50 percent discount on these fees if the applicant possesses a Senior Pass which is part of the Federal Recreational Lands Pass Program. Access Pass holders will also receive a 50 percent discount on these fees.

3) Regulate hunting times and areas to eliminate conflicts with sensitive wildlife and to ensure compatibility with refuge purposes

4) Use staff and volunteers to operate a check station

5) Close the refuge to visitors other than permitted hunters during the hunt days; the only exception is to continue to allow access to Bogle's Wharf

6) Establish a GS-9 Park Ranger/Law enforcement position (same position as identified under objective 1.5.1) to conduct outreach and enforce regulations that allow for a quality program

Objective 3.3.3 (Youth Turkey Hunting):

Within 3 years of CCP approval, more than 80% of youth turkey hunters who are contacted claim to have had a quality turkey hunting experience on the refuge.

Basis of the objective:
Much of the basis for hunting turkey is similar to that described for white-tailed deer hunting under objective 3.3.2. Youth hunting is also recognized as a traditional, family oriented form of recreation. Instilling an appreciation for natural resources and promoting a conservation ethic in youth is a priority for the Refuge System. This youth hunt, implemented in partnership with the National Wild Turkey Federation, has been very popular and provides a great opportunity for outreach to participating youth. Our turkey hunt area map is depicted in chapter 3, map 3.8. As with deer hunting, we generally believe that the extent of our current program meets the needs of our public and provides a quality experience. However, we will continue to evaluate the program on an annual basis and modify it, as warranted, given new biological or visitor data.

Strategies
Continue to:

1) Partner with the local chapter of the National Wild Turkey Federation, to implement guided youth turkey hunting on two days each spring. The National Wild Turkey Federation would continue to assist us in all components of the hunt.

SUBGOAL 4: Provide opportunities for environmental education and interpretation that enhance refuge visitor's understanding of the significant natural resources in the Chesapeake Bay area, as well as the important role the refuge plays in its conservation.

Rationale for subgoal:
Environmental education and interpretation are two of the six priority public uses for National Wildlife Refuges. Opportunities are presently available for

both of these activities on the refuge. While we are not able to meet all requests for these programs, we believe we are offering quality programs to the best of our ability given current staffing levels, and without detracting from our visitor service's management emphases on wildlife observation and photography. Objectives under this subgoal would also help fulfill the Service's initiative to develop programs and activities that "Connect Children with Nature."

Objective 3.4.1 (Environmental Education): Over the next 15 years, facilitate opportunities on the refuge for partner-led and self-guided environmental education programs with developed curriculums, using established relationships with Kent County Schools, the National Aquarium in Baltimore, the Friends of Eastern Neck, and other partners as opportunities arise.

Basis of the objective:
Refuges are learning laboratories, and Service programs are designed to show students and teachers the value of fish and wildlife resources. The refuge offers a unique opportunity to explore in close proximity tidal and non-tidal wetlands, grassland, and forested habitats, as well as learn about managing those landscapes to benefit wildlife. Our staff encounters many demands for guided school programs and in-classroom programs that we are not able to meet. However, we believe we can facilitate other educators to use the refuge and offer excellent environmental education opportunities without expending significant refuge staff or funding resources.

The Kent County School District has curriculum requirements that include field trips to the refuge for every fourth-grade student. In recent years, no staff has been available to assist during these visits except to occasionally meet and provide a short introduction to the refuge. Development of environmental education lessons tailored to state curriculum would provide programs and activities for schools and other groups while increasing public understanding of wildlife needs, ecosystems, conservation, and habitat management for wildlife. Using our educational partners to assist in this endeavor has many benefits. These partners also act as supporters of the refuge and natural resource conservation, advocates for environmental education, and help us conduct outreach to the local community.

We will strive to meet the following guiding principles for a refuge environmental education program identified in Service policy (605 FW 6):

1) Teach awareness, understanding, and appreciation of our natural and cultural resources and conservation history;

2) Allow program participants to demonstrate learning through refuge-specific stewardship tasks and projects that they can carry over into their everyday lives;

3) Establish partnerships to support environmental education both on- and off-site;

4) Support local, State, and national educational standards through environmental education on refuges;

5) Assist refuge staff, volunteers, and other partners in obtaining the knowledge, skills, and abilities to support environmental education;

6) Provide appropriate materials, equipment, facilities, and study locations to support environmental education;

7) Give refuges a way to serve as role models in the community for environmental stewardship; and

8) Minimize conflicts with visitors participating in other compatible wildlife-dependent recreation activities.

This policy also identifies six guidelines on which to base environmental educational programs which we would also strive to adhere to. These guidelines range from connecting people's lives to the natural world, to strengthening conservation literacy and knowledge, to stressing the role of the Refuge System in conservation , and finally to instilling a sense of stewardship and understanding of our conservation history.

Strategies
Continue to:

1) Allow the Kent County School District to use Ingleside Recreation Area for meeting their curriculum needs for fourth grade students

2) Partner with National Aquarium in Baltimore

3) Provide educators and students access to the conference room at the Visitor Contact Station for environmental education visits and lectures

Begin within 2 years of CCP approval:

4) Assist volunteers with the development and implementation of an environmental education program about global climate change and what conservation and stewardship actions could make a difference

5) Encourage the Friends of Eastern Neck and volunteers to expand partnerships with local schools and other educational institutions, as well as the Boy Scouts of America, to enhance utilization of refuge resources for self-guided environmental education through basic lesson plans developed with these partners

6) Revive involvement with Kent County School District to ensure most recent available materials are used for their fourth grade curriculum, which includes field trips to the refuge

Begin within 5 years of CCP approval:

7) Upgrade the visitor services specialist position to a GS-9 (same position as identified under objective 3.1.1) to reflect the increased complexity associated with developing and coordinating program plans and partnerships. This position will also allow us to accomplish all of the visitor services objectives and strategies.

8) Partner with NGOs and academic institutions and develop a network of educators willing to develop curriculum-based lessons using the refuge

Objective 3.4.2 (Interpretation):

Within three years of CCP approval, more than 75% of refuge visitors who are contacted can explain at least three ways the refuge contributes to conserving natural and cultural resources in the Chesapeake Bay ecosystem, know the refuge is part of a national system of refuges, and indicate their plans to actively engage in resource conservation in the future.

Basis of the objective:
Interpretation is one of the most important ways we can increase the visibility of the refuge while providing visitors with many opportunities to understand:

the variety of habitats on the refuge; the historic and cultural significance of the refuge; the importance of wildlife management; the variety of wildlife-dependent recreational opportunities available, and the mission of the National Wildlife Refuge System. Self-guided interpretation requires significantly less staff time than guided programs, and can effectively and efficiently reach many people.

Refuges provide visitors with an understanding and appreciation of fish and wildlife ecology and help people understand their role in the environment through interpretation programs and facilities. The refuge Visitor Contact Station and Bookstore, and hiking trails provide visitors with information about wildlife and refuge management through direct contact, brochures and interpretive panels. Although some new interpretive panels have replaced outdated panels, the general refuge brochure and other interpretive brochures, are outdated. Providing up-to-date interpretive materials to the visitor will enable us to raise awareness and understanding of the mission of the refuge. Interpretive materials also need to be developed that explain how the public's actions may contribute to shoreline erosion and wetland loss and what they can do to help. This would include refuge-specific materials about climate change and stewardship. It is also important that we provide a variety of interpretive programs and opportunities that appeal to a broad-spectrum of interests and learning styles.

Since moving the Visitor Contact Station/Headquarters to its current location, the former Headquarters building has served as volunteer/intern housing. This house is the site of the wind power and solar power station that has powerful interpretation and environmental education possibilities. The house itself serves as a reminder to all visitors of the historical importance of the refuge since it is the only house built as part of a large planned community of houses prior to the refuge being established.

We will strive to meet the following guiding principles for a refuge interpretive program identified in Service policy (605 FW 7):

- Promote visitor understanding of, and increase appreciation for, America's natural and cultural resources and conservation history by providing safe, informative, enjoyable, and accessible interpretive opportunities, products, and facilities;

- Develop a sense of stewardship leading to actions and attitudes that reflect interest and respect for wildlife resources, cultural resources and the environment;

- Provide quality interpretive experiences that help people understand and appreciate the individual refuge and its role in the Refuge System;

- Provide opportunities for quality recreational and interpretive experiences consistent with criteria describing quality found in 605 FW 1.6;

- Assist refuge staff, volunteers, and community support groups in attaining knowledge, skills, and abilities in support of interpretation, and,

- Minimize conflicts with visitors participating in other compatible wildlife-dependent recreational activities.

Strategies

Continue to:

1) Maintain a universally-accessible full-service Visitor Contact Station with a bookstore run by the Friends of Eastern Neck. The Visitor Contact Station

will continue to include interpretive displays and various mounted species of animals found on the refuge. It will continue to include a rear deck with interpretive panels and a boardwalk trail leading to an observation blind. Interpretive panels will continue to be mounted along the boardwalk trial and inside the observation blind.

2) Provide interpretive facilities and materials at Boxes Point Trail, Wildlife Trail and kiosk, Bayview Butterfly Trail and observation platform, Duck Inn Trail, Tubby Cove kiosk, boardwalk and observation blind, Tundra Swan kiosk and boardwalk, Tidal Marsh boardwalk and observation blind, historic site at Wickes, Ingleside Recreation Area with interpretive kiosk and visitor contact station with interpretive exhibits. Once Visitor Service's plan is completed, make sure all interpretive infrastructure, information, and media are consistent with the plan

3) Plan interpretive exhibits that depict the rich cultural and historical resources on the refuge as a principle theme or subject, in addition to the refuge's natural resources

4) Allow permit-guided tours by outside groups, and continue to require permittee to provide information on each program offered on the refuge including type of program, number of participants, and number of programs offered

Within 2 years of CCP approval:

5) Develop and produce a new general refuge brochure

6) Develop and produce a refuge trails brochure

Begin within 5 years of CCP approval:

7) Upgrade the visitor services specialist position to a GS-9 (same position as identified under objective 3.1.1) to reflect the increased complexity associated with developing and coordinating program plans and partnerships. This position will also allow us to accomplish all of the visitor services objectives and strategies, and to:
   a) Develop and produce a new refuge bird checklist and brochure
   b) Develop and install an interpretive kiosk at Wildlife Trail parking area
   c) Develop and install an interpretive kiosk at Bogle's Wharf
   d) Develop and produce a butterfly brochure
   e) Develop interpretive materials explaining the historic and cultural resources of the refuge to gain public awareness of their value and need for protection. This would include information about the proposed development on the island where the current volunteer house is located
   f) Conduct comprehensive sign review on the refuge to ensure that all signage meets national and regional standards

Objective 3.4.3 (Demonstration Areas):

Over the next 15 years, facilitate use of the refuge as a demonstration and learning site for such programs as BayScaping, best management farming and forestry practices, shoreline protection, and tidal marsh restoration.

Basis of the objective:
Our partners value the refuge as a place where certain programs and management activities are showcased and used as a tool for educating other land managers, researchers, local farmers or educators. The programs that draw the most interest are BayScaping, best management farming practices, and tidal marsh restoration.

BayScaping involves maintaining landscaped areas that use native plants which are both aesthetically pleasing, require little-to-no maintenance, and benefit wildlife, water and air quality. Our BayScape garden attracts a wide diversity of birds, butterflies and other insects during the growing season and is very popular with our visitors. The garden is maintained solely by volunteers, including some master gardeners.

Our sustainable cropland management program is a model in implementing best management farming practices which minimize impacts to soil and water quality and provides quality wildlife habitat. This is critical considering the refuge's close proximity to the Chesapeake Bay and its tributaries.

Our shoreline protection and tidal marsh restoration projects, including construction of breakwaters, treating invasive plants, and planting native marsh grass attracts a lot of interest from our volunteers and partners concerned about protecting the Chesapeake Bay shoreline. The restored tidal marsh and beach habitat has been a particular interest of researchers interested in seeing which plants and wildlife colonize the restored area.

We have also begun forest restoration in some upland areas and we expect this program will offer demonstration opportunities in the near future. Also, we will take opportunities to demonstrate our sustainable energy program, namely the solar panel arrays, once we make the final decision on whether to move them to the headquarters from the intern/volunteer house.

We are proud of these programs and enjoy the opportunity to share them with others. While we do not plan to institute a major tour program, nor develop any major infrastructure for this program, we would remain willing to accommodate use of refuge lands by others to the extent it does not interfere or conflict with other refuge priorities.

Strategies
Continue to:

1) Encourage use of the refuge as a demonstration area for sustainable land conservation practices, in conjunction with other refuge outreach activities identified in objectives 3.1.1 and 3.1.2

2) Make sites accessible to partners, and develop education and interpretative materials to the extent funding allows or as provided by volunteer efforts

SUBGOAL 5: Provide opportunities for the public to engage in refuge activities through a Friends Group, an organized volunteer program, and through partnerships with individuals, other agencies, universities, and other institutions, thereby promoting the mission, management, and objectives of the refuge and the Refuge System.

Rationale for subgoal:
Citizen involvement is critical to the well-being of the Refuge System and to the natural resources that depend on those lands. Working in partnership with other government agencies, and academic institutions, organizations, and individuals is vital to our operations. When local citizens and other stakeholders of a refuge can see firsthand our conservation work, they become an informed constituency on behalf of conservation.

Working in partnership with others also provides additional resources with which we can achieve our refuge goals and objectives. Our volunteers, Friends Group,

and other conservation partners provide valuable assistance in accomplishing refuge projects in all our program areas.

Objective 3.5.1 (Friends Group Support):

Over the next 15 years, enhance our relationship with the Friends of Eastern Neck to ensure we have a mutually beneficial working relationship; one that cooperatively promotes an appreciation of natural and cultural resource conservation and facilitates the implementation of priority refuge projects.

Basis for the objective:
The Friends of Eastern Neck have been valuable supporters of the refuge purposes and the Refuge System mission. Many important programs and projects get accomplished each year through their hard work, dedication, and fundraising. Since many members live in the local community, they are also very effective in helping us conduct outreach about the refuge and its opportunities, in addition to providing us feedback from the community.

Strategies
Continue to:

1) Maintain the existing agreement with the Friends of Eastern Neck; review and update on an annual basis as warranted

2) Work with the Friends of Eastern Neck to seek outside support for refuge projects, develop public use programs, coordinate refuge projects, operate the book store, plan and conduct public events, conduct community outreach, promote national Service initiatives as they develop, and respond to all public inquiries about the refuge

3) Appoint a primary liaison between the Friends of Eastern Neck and the Service

4) Support the Friends of Eastern Neck quarterly newsletter, which is distributed to their membership, by regularly providing information, articles, or photos about refuge management and visitor services programs

5) Work with the Friends of Eastern Neck on a regular basis to seek alternative funding sources and partnerships for various projects to benefit the refuge.

Objective 3.5.2 (Volunteer Program):

Over the next 15 years, encourage and facilitate an active, quality volunteer program that supports biological, maintenance and visitor services program priorities.

Basis for the Objective:
We are proud of our volunteer program and what we have been able to accomplish. Volunteers are integrated into all aspects of refuge management including maintenance, habitat management, and visitor services and outreach programs. Their hard work and enthusiasm enhances what programs we can offer. In fact, many of our visitor programs are run by volunteers, without whose assistance, we could not offer them.

Strategies
Continue to:

1) Actively recruit volunteers at events, through existing partners, the media and the refuge website

2) Develop and implement annual volunteer recruitment, training, and appreciation/recognition events

3) Utilize volunteers in annual community events such as the Chestertown Tea Party, Chestertown Wildlife Exposition and Rock Hall Fall Fest

4) Utilize volunteers in meaningful refuge work such as operating the deer check station performing various biological surveys, assisting with maintenance and visitor services activities

Within 5 years of CCP Approval

5) Upgrade the visitor services specialist position to a GS-9 (same position as identified under objective 3.1.1) to reflect the increased complexity associated with developing and coordinating program plans and partnerships. This position will also allow us to accomplish all of the visitor services objectives and strategies, and to increase the number of active volunteers by at least 25%.

Objective 3.5.3 (Maintenance of Facilities and Equipment to Support Research and Visitor Services Programs):

Over the next 15 years, provide and maintain adequate housing, facilities, and equipment for interns, students, resident volunteers, researchers and other conservation partners.

Basis of the objective:
Providing housing, facilities and equipment for interns, students, volunteers, and other conservation partners provides us more flexibility in recruiting participants for these programs. Currently, two sites are available for housing.

Strategies
Continue to:

1) Maintain and make general repairs as needed to the house and a trailer used by over-night interns, volunteers, researchers, and other conservation partners participating in refuge projects and programs

2) Ensure that vehicles and other equipment are in good working order so that safety and efficiency are not compromised. Maintain and make general repairs as needed

Within 5 years of CCP approval:

3) Complete renovations to small volunteer suite currently located in the maintenance compound, making it suitable for lodging

4) Consider the feasibility of constructing an RV pad on the refuge to facilitate additional housing for volunteers

Refuge headquarters

Jonathan Priday/USFWS

Chapter 5

USFWS

Planning team meeting

Consultation and Coordination with Others

Introduction

This chapter describes how we included others in developing this draft CCP and EA and how we plan to continue consulting and coordinating with others in the future. It details how we first invited, and will continue to encourage, the partnership of other Federal and State agencies, civic, public, and private conservation and education organizations, and the affected public in our decisions about managing the Refuge.

It does not detail the dozens of informal discussions the refuge manager and his staff have had over the last two years where the CCP was a topic of conversation. Those involved a wide range of audiences, including congressional representatives or their staffs, local community leaders and other residents, refuge neighbors, refuge visitors, and other interested individuals. During those discussions, the refuge manager and his staff often would provide an update on our progress and encourage comments and other participation.

According to Service policy, we must review and update our final CCP at least once every 15 years, or sooner, in response to significant new information that would markedly change management direction or, our Director or Regional Director deem it necessary. If so, we will once again announce our revised planning and encourage your participation.

Planning to Protect Land and Resources

The current refuge planning effort began six years ago but was interrupted so that CM Complex and Regional staff could focus on completing the CM Complex CCP EA, which was issued as a final CCP/EA in September of 2006. The earlier planning efforts were as follows:

September 2001:	CCP kickoff meeting held at the Refuge with members of the Refuge staff and Regional Office. Visitor Service evaluation conducted.
October 2001:	Sent a letter to the State Director asking that two members of his agency join the Core Planning Team. Held biological and public use workshops to help draft vision and goal statements and identify issues.
June 11, 2002:	Notice of Intent published in the Federal Register. Mailed workbooks to mailing list.
June 2002:	Held public scoping meetings in nearby communities of Rock Hall, Chestertown and Centreville
July-August 2002:	Compile comments from workbooks and public meetings.
October 2002:	Briefing at RO for Region 5 NWRS Chief.
Spring 2003:	a letter was sent to everyone on the project mailing list indicating that due to changes in personnel and regional priorities, the project was being put on hold
August 2006:	Resumed planning project
August 31 to September 1, 2006:	Held a planning team meeting at the refuge
November 8, 2006:	Hosted a biological experts' workshop to facilitate a discussion on natural resource priorities for the refuge. Twenty-five experts attended, representing other federal

agencies, state agencies, researchers and national and private non-governmental conservation organizations. The participants identified resource priorities such as migrating and wintering waterfowl, federal and state-listed species, shallow water habitats, and healthy and diverse habitats, free of invasive plants.

December 2006: Distributed a newsletter to all those on the refuge CCP mailing list notifying everyone that the planning process was restarted.

January 17, 2007: Held a public information open house meeting to discuss our renewed planning efforts. We also published a Notice of Intent to re-initiate preparation of a comprehensive conservation plan and environmental assessment in the Federal Register.

September 2009: Issued a Federal Register Notice regarding the availability of the draft CCP/EA. Held a public meeting and open house to discuss the draft CCP/EA and to gather public input and comments.

Partnerships Involved in Planning and/or Refuge Projects

Refuge programs enjoy a great deal of popular support. Program partnerships have developed in many ways, and exist in every arena of refuge management, from weekly waterfowl surveys to the running of the Visitor Center and Bookstore by the Friends of Eastern Neck.

As public interest in protecting the refuge's resources has grown, additional partnerships among the Service, States, and other agencies have also developed. Our opportunities for ever greater partnerships now encompass an array of community organizations and individuals, some of whom appear below.

- American Legion of Rock Hall
- Chesapeake Alliance
- Chesapeake Paddlers Association
- Chester River Association River Keepers
- Friends of Eastern Neck
- Maryland Department of Natural Resources
- Maryland Department of the Environment
- Maryland Energy Administration
- National Aquarium in Baltimore
- National Renewable Energy Laboratory
- National Wild Turkey Federation
- Kent County Bird Club
- Kent County Dept. of Parks and Recreation

- Kent County Dept of Tourism
- Kent County Roads Dept

Under the 1997 Refuge Improvement Act, we must review and update our plan at least once every 15 years, or sooner, should our Director deem it necessary. At that time, we will once again announce our planning for its revision, and once again request your participation.

Contact Information

Eastern Neck National Wildlife Refuge
1730 Eastern Neck Road
Rock Hall, MD 21661-1815
Phone: 410/639-2108; 410/639-2516 fax
http://www.fws.gov/northeast/easternneck

Chesapeake Marshlands Refuge Complex
2145 Key Wallace Drive
Cambridge, MD 21613
Phone: 410/228-2677
http://www.fws.gov/blackwater/

U.S. Fish and Wildlife Service
NWRS – Refuge Planning
300 Westgate Center Drive
Hadley, Massachusetts 01035–9589
413/253–8636 telephone; 413/253–8468 fax
http://northeast.fws.gov/planning

Writers and Major Contributors

The following individuals contributed directly to the preparation of this CCP/EA document:

Suzanne Baird	*Project Leader,* Chesapeake Marshlands Refuge Complex
Dixie Birch	*Supervisory Wildlife Biologist,* Chesapeake Marshlands Refuge Complex
Maggie Briggs	*Supervisory Visitor Services Specialist,* Chesapeake Marshlands Refuge Complex
Glenn Carowan	(retired) *former Project Leader,* Chesapeake Marshlands Refuge Complex
Rachel Cliché	(transferred) *Wildlife Biologist,* Chesapeake Marshlands Refuge Complex
Tom Eagle	(transferred) *former Deputy Refuge Manager,* Eastern Neck Refuge
Bill Giese	*Fire Control Officer,* Chesapeake Marshlands Refuge Complex
Cindy Heffley	(transferred) *former Visitor Services Specialist,* Chesapeake Marshlands Refuge Complex
Marty Kaehny	(retired) *former Refuge Manager,* Eastern Neck Refuge

Larry McGowan	*Deputy Project Leader,* Chesapeake Marshlands Refuge Complex
Nancy McGarigal	*Refuge Planner,* Region 5 Regional Office
Rebekah Packett	(transferred) *former Refuge Operations Needs Specialist,* Chesapeake Marshlands Refuge Complex
Jonathan Priday	(transferred) *former Wildlife Refuge Specialist,* Eastern Neck NWR
Roger Stone	(retired) *Wildlife Biologist and GIS Specialist,* Chesapeake Marshlands Refuge Complex
Les Vilchek	*Cartographic and Spatial Data Specialist,* Chesapeake Marshlands Refuge Complex

Contractors Assisting in Document Preparation

Phil Sczerzenie	*Senior Wildlife Biologist,* Mangi Environmental Group, Inc.
Mark Blevins	*GIS Specialist,* Mangi Environmental Group, Inc.
Meghan Morse	*Analyst,* Mangi Environmental Group, Inc.

Other Individuals Consulted During CCP/EA Preparation

U.S. Fish and Wildlife Service

Randy Dettmers	*Migratory Bird Biologist,* Region 5 Regional Office
Chris Dwyer	*Migratory Bird Biologist,* Region 5 Regional Office
Jan Taylor	*Regional Refuge Biologist,* Region 5 Regional Office
Hal Laskowski	*Cross-Regional Biological Monitoring Team Coordinator*
John Wilson	*Regional Archeologist,* Region 5 Regional Office
Cherry Keller	*Threatened and Endangered Species Biologist,* Chesapeake Bay Field Office

Maryland Department of Natural Resources

Larry Hindman	*Waterfowl Project Manager*
Glenn Therres	*Associate Director,* Natural Heritage Program

John Mosesso, Jr./NBII

Yellow warbler

Glossary
(including list of acronyms)

accessibility — the state or quality of being easily approached or entered, particularly as it relates to complying with the Americans With Disabilities Act

accessible facilities — structures accessible for most people with disabilities without assistance; facilities that meet UFAS standards; ADA-accessible

[E.g., parking lots, trails, pathways, ramps, picnic and camping areas, restrooms, boating facilities (docks, piers, gangways), fishing facilities, playgrounds, amphitheaters, exhibits, audiovisual programs, and wayside sites.]

adaptation — adjustment to environmental conditions

adaptive management — a systematic decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood.

(Source: Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2007. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.)

advanced regeneration — tree seedlings or small saplings that develop in the understory prior to the removal of the overstory.

aggregate — many parts considered together as a whole

alternative — a reasonable way to fix an identified problem or satisfy a stated need [40 CFR 1500.2 (cf. "management alternative")]

appropriate use — a proposed or existing use on a refuge that meets at least one of the following three conditions:

1. the use is a wildlife-dependent one;
2. the use contributes to fulfilling the refuge purpose(s), the System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the National Wildlife Refuge System Improvement Act was signed into law; or
3. the use has been determined appropriate as specified in section 1.11 of that act.

approved acquisition boundary — a project boundary that the Director of the U.S. Fish and Wildlife Service approves upon completion of the planning and environmental compliance process. An approved acquisition boundary only designates those lands which the Service has authority to acquire or manage through various agreements. The approval of an acquisition boundary does not grant the Service jurisdiction or control over lands within the boundary, and it does not make lands within the refuge boundary part of the National Wildlife Refuge System. Lands do not become part of the System until the Service buys them or they are placed under an agreement that provides for their management as part of the System.

anadromous fish — from the Greek, literally "up-running"; fish that spend a large portion of their life cycle in the ocean and return to freshwater to breed

aquatic growing in, living in, or dependent upon water

aquatic barrier any obstruction to fish passage

avian of or having to do with birds

avifauna all birds of a given region

barrier cf. "aquatic barrier"

basin the land surrounding and draining into a water body (cf. "watershed")

benthic living at, in, or associated with structures on the bottom of a body of water

best management practices land management practices that produce desired results

[N.b. Usually describing forestry or agricultural practices effective in reducing non-point source pollution, like reseeding skidder trails or not storing manure in a flood plain. In their broader sense, practices that benefit target species.]

biological diversity or biodiversity the variety of life and its processes and includes the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur

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

biodiversity conservation the goal of conservation biology, which is to retain indefinitely as much of the earth's biodiversity as possible, with emphasis on biotic elements most vulnerable to human impacts

biomass the total mass or amount of living organisms in a particular area or volume

biota the plant and animal life of a region

breeding habitat habitat used by migratory birds or other animals during the breeding season

buffer species alternate prey species exploited by predators when a more preferred prey is in relatively short supply; i.e., if rabbits are scarce, foxes will exploit more abundant rodent populations

buffer zones land bordering and protecting critical habitats or water bodies by reducing runoff and nonpoint source pollution loading; areas created or sustained to lessen the negative effects of land development on animals, plants, and their habitats

candidate species plants and animals for which the U.S. Fish and Wildlife Service (FWS) has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act (ESA), but for which development of a proposed listing regulation is precluded by other higher priority listing activities (Source: http://www.fws.gov/endangered/factsheets/candidate_species.pdf)

canopy the layer of foliage formed by the crowns of trees in a stand. For stands with trees of different heights, foresters often distinguish among the upper, middle and lower canopy layers. These represent foliage on tall, medium, and short trees. The uppermost layers are called the overstory.

community the locality in which a group of people resides and shares the same government

community type a particular assemblage of plants and animals, named for its dominant characteristic

compatible use "The term 'compatible use' means a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the refuge."—National Wildlife Refuge System Improvement Act of 1997 [Public Law 105-57; 111 Stat. 1253]

compatibility determination a required determination for wildlife-dependent recreational uses or any other public uses of a refuge

Comprehensive Conservation Plan mandated by the 1997 Refuge Improvement Act, a document that provides a description of the desired future conditions and long-range guidance for the project leader to accomplish purposes of the refuge system and the refuge. CCPs establish management direction to achieve refuge purposes. [P.L. 105-57; FWS Manual 602 FW 1.4]

concern cf. "issue"

conifer a tree or shrub in the phylum Gymnospermae whose seeds are borne in woody cones. There are 500–600 species of living conifers (Norse 1990)

connectivity community occurrences and reserves have permeable boundaries and thus are subject to inflows and outflows from the surrounding landscape. Connectivity in the selection and design of nature reserves relates to the ability of species to move across the landscape to meet basic habitat requirements. Natural connecting features within the ecoregion may include river channels, riparian corridors, ridgelines, or migratory pathways.

conservation managing natural resources to prevent loss or waste

[N.b. Management actions may include preservation, restoration, and enhancement.]

conservation agreements written agreements among two or more parties for the purpose of ensuring the survival and welfare of unlisted species of fish and wildlife or their habitats or to achieve other specified conservation goals. Participants voluntarily commit to specific actions that will remove or reduce threats to those species.

conservation easement a non-possessory interest in real property owned by another imposing limitations or affirmative obligations with the purpose of returning or protecting the property's conservation values.

conservation status assessment of the status of ecological processes and of the viability of species or populations in an ecoregion.

consultation a type of stakeholder involvement in which decision makers ask stakeholders to comment on proposed decisions or actions.

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

cord an 8-foot-long pile of wood stacked 4 feet high and composed of 4-foot-long pieces.

critical habitat according to U.S. Federal law, the ecosystems upon which endangered and threatened species depend

cultural resource inventory a professional study to locate and evaluate evidence of cultural resources within a defined geographic area

[N.b. Various levels of inventories may include background literature searches, comprehensive field examinations to identify all exposed physical manifestations of cultural resources, or sample inventories for projecting site distribution and density over a larger area. Evaluating identified cultural resources to determine their eligibility for the National Register follows the criteria in 36 CFR 60.4 (cf. FWS Manual 614 FW 1.7).]

cultural resource overview a comprehensive document prepared for a field office that discusses, among other things, project 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 of how program objectives should be met and conflicts resolved

[An overview should reference or incorporate information from a field offices background or literature search described in section VIII of the Cultural Resource Management Handbook (FWS Manual 614 FW 1.7).]

database a collection of data arranged for ease and speed of analysis and retrieval, usually computerized

dbh (diameter at breast height) — the diameter of the stem of tree measure at breast height (usually 4.5 feet above the ground). The term is commonly used by foresters to describe tree size.

dedicated open space land to be held as open space forever

degradation the loss of native species and processes due to human activities such that only certain components of the original biodiversity persist, often including significantly altered natural communities

designated wilderness area an area designated by Congress as part of the National Wilderness Preservation System [FWS Manual 610 FW 1.5 (draft)]

desired future condition the qualities of an ecosystem or its components that an organization seeks to develop through its decisions and actions.

digitizing the process of converting maps into geographically referenced electronic files for a geographic information system (GIS)

distribution pattern the overall pattern of occurrence for a particular conservation target. In ecoregional planning projects, often referred to as the relative proportion of the target's natural range occurring within a give ecoregion (e.g. endemic, limited, widespread, disjunct, peripheral).

disturbance any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment

donation a citizen or group may wish to give land or interests in land to the Service for the benefit of wildlife. Aside from the cost factor, these acquisitions are no different than any other means of land acquisition. Gifts and donations have the same planning requirements as purchases.

easement a non-possessory interest in real property that permits the holder to use another's land for a specified purpose. It may also impose limitations or affirmative obligations on the holder of the land subject to the easement. An agreement by which landowners give up or sell one of the rights on their property

[E.g., landowners may donate rights-of-way across their properties to allow community members access to a river (cf. "conservation easement").]

ecological integrity native species populations in their historic variety and numbers naturally interacting in naturally structured biotic communities. For communities, integrity is governed by demographics of component species, intactness of landscape-level ecological processes (e.g., natural fire regime), and intactness of internal community processes (e.g., pollination).

ecological land unit (ELU) mapping units used in large-scale conservation planning projects that are typically defined by two or more environmental variables such as elevation, geological type, and landform (e.g., cliff, stream, summit).

ecological processes a complex mix of interactions among animals, plants, and their environment that ensures maintenance of an ecosystem's full range of biodiversity. Examples include population and predator-prey dynamics, pollination and seed dispersal, nutrient cycling, migration, and dispersal

ecological process approach an approach to managing for species communities that manages for ecological process (e.g., flooding, fire, herbivory, predator-prey dynamics) within the natural range of historic variability. This approach assumes that if ecological processes are occurring within their historic range of spatial and temporal variability, then the naturally occurring biological diversity will benefit.

ecological system Dynamic assemblages of communities that occur together on the landscape at some spatial scale of resolution, are tied together by similar ecological processes, and form a cohesive, distinguishable unit on the ground. Examples are spruce-fir forest, Great Lakes dune and swale complex, Mojave desert riparian shrublands.

ecoregion a territory defined by a combination of biological, social, and geographic criteria, rather than geopolitical considerations; generally, a system of related, interconnected ecosystems.

ecosystem a natural community of organisms interacting with its physical environment, regarded as a unit

ecosystem service a benefit or service provided free by an ecosystem or by the environment, such as clean water, flood mitigation, or groundwater recharge

ecotourism visits to an area that maintains and preserves natural resources as a basis for promoting its economic growth and development

ecosystem approach a way of looking at socio-economic and environmental information based on the boundaries of ecosystems like watersheds, rather than on geopolitical boundaries

ecosystem based management an approach to making decisions based on the characteristics of the ecosystem in which a person or thing belongs

[N.b. This concept considers interactions among the plants, animals, and physical characteristics of the environment in making decisions about land use or living resource issues.]

edge effect the phenomenon whereby edge-sensitive species are negatively affected near edges by factors that include edge-generalist species, human influences, and abiotic factors associated with habitat edges. Edge effects are site-specific and factor-specific and have variable depth effects into habitat fragments.

emergent wetland wetlands dominated by erect, rooted, herbaceous plants

endangered species a Federal- or State-listed protected species in danger of extinction throughout all or a significant portion of its range

endemic a species or race native to a particular place and found only there

environment the sum total of all biological, chemical and physical factors to which organisms are exposed

environmental education curriculum-based education aimed at producing a citizenry that is knowledgeable about the biophysical environment and its associated problems, aware of how to help solve those problems, and motivated to work toward solving them

environmental health the composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment

Environmental Assessment (EA) a public document that discusses the purpose and need for an action, its alternatives, and provides sufficient evidence and analysis of its impacts to determine whether to prepare an environmental impact statement or a finding of no significant impact (q.v.) [cf. 40 CFR 1508.9]

Environmental Impact Statement (EIS) a detailed, written analysis of 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 [cf. 40 CFR 1508.11]

euphotic relating to the upper, well-illuminated zone of a lake where photosynthesis occurs

eutrophic lake a lake possessing low or a complete absence of oxygen in the deeper portion in midsummer, rich in nutrients and plankton

eutrophication enrichment of a body of water by the addition of nutrients which stimulate the growth of aquatic plants and may cause a decrease in the organoleptic properties of the water source.

evaluation examination of how an organization's plans and actions have turned out — and adjusting them for the future.

even-aged a stand having one age class of trees

exemplary community type an outstanding example of a particular community type

extinction the termination of any lineage of organisms, from subspecies to species and higher taxonomic categories from genera to phyla. Extinction can be local, in which one or more populations of a species or other unit vanish but others survive elsewhere, or total (global), in which all the populations vanish (Wilson 1992)

extirpated status of a species or population that has completely vanished from a given area but that continues to exist in some other location

exotic species a species that is not native to an area and has been introduced intentionally or unintentionally by humans; not all exotics become successfully established

extant in biology, a species which is not extinct; still existing

fauna all animal life associated with a given habitat, country, area or period

federal land public land owned by the Federal Government, including national forests, national parks, and national wildlife refuges

federal-listed species a species listed either as endangered, threatened, or a species at risk (formerly, a "candidate species") under the Endangered Species Act of 1973, as amended

fee-title acquisition the acquisition of most or all of the rights to a tract of land; a total transfer of property rights with the formal conveyance of a title. While a fee-title acquisition involves most rights to a property, certain rights may be reserved or not purchased, including water rights, mineral rights, or use reservation (e.g., the ability to continue using the land for a specified time period, such as the remainder of the owner's life).

fen A type of wetland that accumulates peat deposits. Fens are less acidic than bogs, deriving most of their water from groundwater rich in calcium and magnesium

Finding of No Significant Impact (FONSI) supported by an environmental assessment, a document 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]

fire regime the characteristic frequency, intensity, and spatial distribution of natural fires within a given ecoregion or habitat

fish passage project providing a safe passage for fish around a barrier in the upstream or downstream direction

flora all the plants found in a particular place

floodplain flat or nearly flat land that may be submerged by floodwaters; a plain built up or in the process of being built up by stream deposition

flyway any one of several established migration routes of birds

focal species — a species that is indicative of particular conditions in a system (ranging from natural to degraded) and used as a surrogate measure for other species of particular conditions. An element of biodiversity selected as a focus for conservation planning or action. The two principal types of targets in Conservancy planning projects are species and ecological communities.

focus areas — cf. "special focus areas"

forest association — the community described by a group of dominant plant (tree) species occurring together, such as spruce-fir or northern hardwoods

forested land — land dominated by trees

[For impacts analysis in CCP's, we assume all forested land has the potential for occasional harvesting; we assume forested land owned by timber companies is harvested on a more intensive, regular schedule.]

fragmentation — the disruption of extensive habitats into isolated and small patches. Fragmentation has two negative components for biota: the loss of total habitat area; and, the creation of smaller, more isolated patches of habitat remaining.

geographic information system — (GIS) a computerized system to compile, store, analyze and display geographically referenced information

[E.g., GIS can overlay multiple sets of information on the distribution of a variety of biological and physical features.]

graminoid — grasses and grasslike plants, such as sedges.

grant agreement — the legal instrument used when the principal purpose of the transact-ion is the transfer of money, property, services, or anything of value to a recipient in order to accomplish a public purpose of support or stimulation authorized by Federal statute and substantial involvement between the Service and the recipient is not anticipated (cf. "cooperative agreement") (Grants and Cooperative Agreement Act at 31 U.S.C. § 6305)

grassroots conservation organization — any group of concerned citizens who act together to address a conservation need

groundwater — water in the ground that is in the zone of saturation, from which wells and springs and groundwater runoff are supplied

guild — a group of organisms, not necessarily taxonomically related, that are ecologically similar in characteristics such as diet, behavior, or microhabitat preference, or with respect to their ecological role in general

habitat block — a landscape-level variable that assesses the number and extent of blocks of contiguous habitat, taking into account size requirements for populations and ecosystems to function naturally. It is measured here by a habitat-dependent and ecoregion size-dependent system

habitat fragmentation — the breaking up of a specific habitat into smaller, unconnected areas

[N.b. A habitat area that is too small may not provide enough space to maintain a breeding population of the species in question.]

habitat conservation protecting an animal or plant habitat to ensure that the use of that habitat by the animal or plant is not altered or reduced

habitat The place or type of site where species and species assemblages are typically found and/or successfully reproduce.

[N.b. An organism's habitat must provide all of the basic requirements for life, and should be free of harmful contaminants.]

historic conditions the composition, structure and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgement, were present prior to substantial human-related changes to the landscape

hydrologic or flow regime characteristic fluctuations in river flows

hydrology the science of waters of the earth: their occurrences, distributions, and circulations; their physical and chemical properties; and their reactions with the environment, including living beings

important fish areas the aquatic areas identified by private organizations, local, state, and federal agencies that meet the purposes of the Conte Act

impoundment a body of water, such as a pond, confined by a dam, dike, floodgate, or other barrier, which is used to collect and store water for future use

indicator species a species used as a gauge for the condition of a particular habitat, community, or ecosystem. A characteristic or surrogate species for a community or ecosystem

indigenous native to an area

indigenous species a species that, other than a result as an introduction, historically occurred or currently occurs in a particular ecosystem

interjurisdictional fish populations of fish that are managed by two or more States or national or tribal governments because of the scope of their geographic distributions or migrations

interpretive facilities structures that provide information about an event, place, or thing by a variety of means, including printed, audiovisual, or multimedia materials

[E.g., kiosks that offer printed materials and audiovisuals, signs, and trail heads.]

interpretive materials any tool used to provide or clarify information, explain events or things, or increase awareness and understanding of the events or things

[E.g., printed materials like brochures, maps or curriculum materials; audio/visual materials like video and audio tapes, films, or slides; and, interactive multimedia materials, CD-ROM or other computer technology.]

interpretive materials projects any cooperative venture that combines financial and staff resources to design, develop, and use tools for increasing the awareness and understanding of events or things related to a refuge

introduced invasive species non-native species that have been introduced into an area and, because of their aggressive growth and lack of natural predators, displace native species

invasive species an alien species whose introduction causes or is likely to cause economic or environmental harm or harm to human health

inventory a list of all the assets and liabilities of an organization, including physical, financial, personnel, and procedural aspects.

invertebrate any animal lacking a backbone or bony segment that encloses the central nerve cord

issue any unsettled matter that requires a management decision

[E.g., a Service initiative, an opportunity, a management problem, a threat to the resources of the unit, a conflict in uses, a public concern, or the presence of an undesirable resource condition.]

[N.b. A CCP should document, describe, and analyze issues even if they cannot be resolved during the planning process (FWS Manual 602 FW 1.4).]

Land Protection Plan (LPP) a document that identifies and prioritizes lands for potential Service acquisition from a willing seller, and also describes other methods of providing protection. Landowners within project boundaries will find this document, which is released with environmental assessments, most useful.

Land trusts organizations dedicated to conserving land by purchase, donation, or conservation easement from landowners

landform the physical shape of the land reflecting geologic structure and processes of geomorphology that have sculpted the structure

landscape A heterogeneous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout.

landscape approach an approach to managing for species communities that focuses on landscape patterns rather than processes and manages landscape elements to collectively influence groups of species in a desired direction. This approach assumes that by managing a landscape for its components, the naturally occurring species will persist.

large patch Communities that form large areas of interrupted cover. Individual occurrences of this community type typically range in size from 50 to 2,000 hectares. Large patch communities are associated with environmental conditions that are more specific than those of matrix communities, and that are less common or less extensive in the landscape. Like matrix communities, large-patch communities are also influenced by large-scale processes, but these tend to be modified by specific site features that influence the community.

late-successional species, assemblages, structures, and processes associated with mature natural communities that have not experienced significant disturbance for a long time

limiting factor an environmental limitation that prevents further population growth

limits of acceptable change a planning and management framework for establishing and maintaining acceptable and appropriate environmental and social conditions in recreation settings

local land public land owned by local governments, including community or county parks or municipal watersheds

local agencies generally, municipal governments, regional planning commissions, or conservation groups

long-term protection mechanisms like fee title acquisition, conservation easements, or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintaining species populations over the long term

macroinvertebrates invertebrates large enough to be seen with the naked eye (e.g., most aquatic insects, snails, and amphipods)

management alternative a set of objectives and the strategies needed to accomplish each objective [FWS Manual 602 FW 1.4]

management concern cf. "issue" and "migratory nongame birds of management concern"

management opportunity cf. "issue"

management plan a plan that guides future land management practices on a tract

[N.b. In the context of an environmental impact statement, management plans may be designed to produce additional wildlife habitat along with primary products like timber or agricultural crops (cf. "cooperative agreement").]

management strategy a general approach to meeting unit objectives

[N.b. A strategy may be broad, or it may be detailed enough to guide implementation through specific actions, tasks, and projects (FWS Manual 602 FW 1.4).]

marshlands areas interspersed with open water, emergent vegetation (hydrophytes), and terrestrial vegetation (phreatophytes).

matrix forming (or matrix community) communities that form extensive and contiguous cover may be categorized as matrix (or matrix-forming) community types. Matrix communities occur on the most extensive landforms and typically have wide ecological tolerances. They may be characterized by a complex mosaic of successional stages resulting from characteristic disturbance processes (e.g. New England northern hardwood-conifer forests). Individual occurrences of the matrix type typically range in size from 2000 to 500,000 hectares. In a typical ecoregion, the aggregate of all matrix communities covers, or historically covered, as much as 75-80% of the natural vegetation of the ecoregion. Matrix community types are often influenced by large-scale processes (e.g., climate patterns, fire), and are important habitat for wide-ranging or large area-dependent fauna, such as large herbivores or birds

mesic soil sandy-to-clay loams containing moisture-retentive organic matter, well drained (no standing matter)

metapopulation a network of semi-isolated populations with some level of regular or intermittent migration and gene flow among them, in which individual populations may go extinct but can then be recolonized from other populations.

migratory nongame birds of management concern species of nongame birds that (a) are believed to have undergone significant population declines; (b) have small or restricted populations; or (c) are dependent upon restricted or vulnerable habitats

mission statement a succinct statement of the purpose for which the unit was established; its reason for being

mitigation actions to compensate for the negative effects of a particular project

[E.g., wetland mitigation usually restores or enhances a previously damaged wetland or creates a new wetland.]

mosaic an interconnected patchwork of distinct vegetation types.

National Environmental Policy Act of 1969 (NEPA) requires all Federal agencies to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in planning and implementing environmental actions

[Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (cf. 40 CFR 1500).]

National Wildlife Refuge System (Refuge System) all lands and waters and interests therein administered by the Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas managed to preserve a national network for the conservation and management of fish, wildlife and plant resources of the United States, for the benefit of present and future generations (National Wildlife Refuge System Improvement Act, 16 USC 668dd).

native a species that, other than as a result of an introduction, historically occurred or currently occurs in a particular ecosystem

native plant a plant that has grown in the region since the last glaciation, and occurred before European settlement

natural disturbance event any natural event that significantly alters the structure, composition, or dynamics of a natural community: e.g., floods, fires, and storms

natural range of variation a characteristic range of levels, intensities, and periodicities associated with disturbances, population levels, or frequency in undisturbed habitats or communities

niche the specific part or smallest unit of a habitat occupied by an organism

Neotropical migrant birds, bats, or invertebrates that seasonally migrate between the Nearctic and Neotropics

non-consumptive, wildlife-oriented recreation wildlife observation and photography and environmental education and interpretation (cf. “wildlife-oriented recreation”)

non-native species See “exotic species.”

non-point source pollution a diffuse form of water quality degradation in which wastes are not released at one specific, identifiable point but from a number of points that are spread out and difficult to identify and control (Eckhart 1998)

nonforested wetlands wetlands dominated by shrubs or emergent vegetation

nonpoint source a diffuse form of water quality degradation produced by erosion of land that causes sedimentation of streams, eutrophication from nutrients and pesticides used in agricultural and silvicultural practices, and acid rain resulting from burning fuels that contain sulfur (Lotspeich and Platts 1982)

Notice of Intent (NOI) an announcement we publish in the Federal Register that we will prepare and review an environmental impact statement [40 CFR 1508.22]

objective cf. "unit objective"

obligate species a species that must have access to a particular habitat type to persist

occurrence site a discrete area where a population of a rare species lives or a rare plant community type grows

outdoor education project any cooperative venture that combines financial and staff resources to develop outdoor education activities like labs, field trips, surveys, monitoring, or sampling

outdoor education educational activities that take place in an outdoor setting

palustrine wetlands "The Palustrine system includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0%." - Cowardin et al. 1979

Partners for Wildlife Program a voluntary, cooperative habitat restoration program among the Service, other government agencies, public and private organizations, and private landowners to improve and protect fish and wildlife habitat on private land while leaving it in private ownership

partnership a contract or agreement among two or more individuals, groups of individuals, organizations, or agencies, in which each agrees to furnish a part of the capital or some service in kind (e.g., labor) for a mutually beneficial enterprise

passive management protecting, monitoring key resources and conducting baseline inventories to improve our knowledge of the ecosystem

payment in lieu of taxes cf. Revenue Sharing Act of 1935, Chapter One, Legal Context

point source a source of pollution that involves discharge of waste from an identifiable point, such as a smokestack or sewage-treatment plant (Eckhardt, 1998)

population an interbreeding group of plants or animals. The entire group of organisms of one species.

population monitoring assessing the characteristics of populations to ascertain their status and establish trends on their abundance, condition, distribution, or other characteristics

prescribed fire — the application of fire to wildland fuels, either by natural or intentional ignition, to achieve identified land use objectives [FWS Manual 621 FW 1.7]

priority general public use — a compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation

private land — land owned by a private individual or group or non-government organization

private organization — any non-government organization

proposed wilderness — an area of the Refuge System that the Secretary of the Interior has recommended to the President for inclusion in the National Wilderness Preservation System

protection — mechanisms like fee title acquisition, conservation easements, or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintaining species populations at a site (cf. "long-term ~")

public — individuals, organizations, and non-government groups; officials of Federal, State, and local government agencies; Native American tribes, and foreign nations—includes anyone outside the core planning team, those who may or may not have indicated an interest in the issues, and those who do or do not realize that our decisions may affect them

public involvement — offering an opportunity to interested individuals and organizations whom our actions or policies may affect to become informed; soliciting their opinions. We thoroughly study public input, and give it thoughtful consideration in shaping decisions about managing refuges.

public involvement plan — long-term guidance for involving the public in the comprehensive planning process

public land — land owned by the local, State, or Federal Government

rare species — species identified for special management emphasis because of their uncommon occurrence within a watershed

rare community types — plant community types classified as rare by any State program; includes exemplary community types

recharge — refers to water entering an underground aquifer through faults, fractures, or direct absorption

recommended wilderness — areas studied and found suitable for wilderness designation by both the Director (FWS) and Secretary (DOI), and recommended by the President to Congress for inclusion in the National Wilderness System [FWS Manual 610 FW 1.5 (draft)]

Record of Decision (ROD) a concise public record of a decision by a Federal agency pursuant to NEPA

[N.b. A ROD includes:

* the decision;

* all the alternatives considered;

* the environmentally preferable alternative;

* a summary of monitoring and enforcement, where applicable, for any mitigation; and,

* whether all practical means have been adopted to avoid or minimize environmental harm from the alternative selected (or if not, why not).]

refuge goals "descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose but do not define measurable units." (Writing Refuge Management Goals and Objectives: A Handbook, FWS January 2004)

refuge purposes "the terms 'purposes of the refuge' and 'purposes of each refuge' mean 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 subunit." (National Wildlife Refuge System Improvement Act of 1997)

refuge lands lands in which the Service holds full interest in fee title or partial interest like an easement

regenerating establishing a new age class. Silviculture does this in a way that controls the species composition, seedling density, and other characteristics consistent with the landowner's objectives.

relatively intact the conservation status category indicating the least possible disruption of ecosystem processes. Natural communities are largely intact, with species and ecosystem processes occurring within their natural ranges of variation.

relatively stable the conservation status category between vulnerable and relatively intact in which extensive areas of intact habitat remain, but local species declines and disruptions of ecological processes have occurred

restoration management of a disturbed or degraded habitat that results in the recovery of its original state

[E.g., restoration may involve planting native grasses and forbs, removing shrubs, prescribed burning, or reestablishing habitat for native plants and animals on degraded grassland.]

restoration ecology the process of using ecological principles and experience to return a degraded ecological system to its former or original state

riparian referring to the interface between freshwater habitats and the terrestrial landscape

riparian forested land forested land along a stream or river

riparian habitat habitat along the banks of a stream or river [cf. note above]

riverine within the active channel of a river or stream

riverine wetlands generally, all the wetlands and deepwater habitats occurring within a freshwater river channel not dominated by trees, shrubs, or persistent emergents

rotation the period of time from establishment of an even-aged stand until its maturity

runoff water from rain, melted snow, or agricultural or landscape irrigation that flows over a land surface into a water body (cf. "urban runoff")

scale the magnitude of a region or process. Refers to both spatial size—for example, a (relatively small-scale) patch or a (relatively large-scale) landscape; and a temporal rate—for example, (relatively rapid) ecological succession or (relatively slow) evolutionary speciation

Selection cutting/selection system The silvicultural system used to regenerate and maintain uneven-aged stands. Selection cuttings are used to remove individual or small groups of mature trees to regenerate a new cohort, as well as to thin the immature age classes to promote their growth and improve their quality.

Service presence Service programs and facilities that it directs or shares with other organizations; public awareness of the Service as a sole or cooperative provider of programs and facilities

shifting mosaic an interconnected patchwork of distinct vegetation types that may shift across the land surface as a result of dynamic ecosystem processes, such as periodic wildfire or flooding.

shrublands habitats dominated by various species of shrubs, often with many grasses and forbs

silviculture tending and regenerating forest stands to realize sought after benefits and sustain them over time

site improvement any activity that changes the condition of an existing site to better interpret events, places, or things related to a refuge

[E.g., improving safety and access, replacing non-native with native plants, refurbishing footbridges and trailways, and renovating or expanding exhibits.]

small patch communities that form small, discrete areas of vegetation cover. Individual occurrences of this community type typically range in size from 1 to 50 hectares. Small patch communities occur in very specific ecological settings, such as on specialized landform types or in unusual

microhabitats. The specialized conditions of small patch communities, however, are often dependent on the maintenance of ecological processes in the surrounding matrix and large patch communities. In many ecoregions, small patch communities contain a is proportionately

large percentage of the total flora, and also support a specific and restricted set of associated fauna (e.g., invertebrates or herpetofauna) dependent on specialized conditions.

source population a population in a high-quality habitat where the birth rate greatly exceeds the death rate, and the excess individuals emigrate

spatial pattern within an ecoregion, natural terrestrial communities may be categorized into three functional groups on the basis of their current or historical patterns of occurrence, as correlated with the distribution and extent of landscape features and ecological processes. These groups are identified as matrix communities, large patch communities, and small patch communities.

special focus area an area of high biological value

[N.b. We normally direct most of our resources to SFA's that were delineated because of: the presence of Federal-listed endangered and threatened species, species at risk (formerly, "candidate species"), rare species, concentrations of migrating or wintering waterfowl, or shorebird stopover habitat;

1. their importance as migrant landbird stopover or breeding habitat;

2. the presence of unique or rare communities; or

3. the presence of important fish habitat.]

special habitats wetlands, vernal pools, riparian habitat, and unfragmented rivers, forests and grasslands

[N.b. Many rare species depend on specialized habitats that, in many cases, are being lost within a watershed.]

special riparian project restoring, protecting, or enhancing an aquatic environment in a discrete riparian corridor within a special focus area

species the basic category of biological classification intended to designate a single kind of animal or plant. Any variation among the individuals may be regarded as not affecting the essential sameness which distinguishes them from all other organisms.

species assemblage the combination of particular species that occur together in a specific location and have a reasonable opportunity to interact with one another

species at risk A general term referring to species listed under the Endangered Species Act (ESA), as well as for unlisted species that are declining in population. Sometimes the term is used interchangeably with "species of concern". Such species, unless already listed under ESA, receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing (Source: http://www.fws.gov/endangered/glossary.html).

species of concern an informal term referring to a species that might be in need of conservation action. This may range from a need for periodic monitoring of populations and threats to the species and its habitat, to the necessity for listing as threatened or endangered under the Endangered Species Act. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing (Source: http://www.fws.gov/endangered/glossary.html).

species diversity usually synonymous with "species richness," but may also include the proportional distribution of species

species richness a simple measure of species diversity calculated as the total number of species in a habitat or community (Fiedler and Jain 1992)

stand an area of trees with a common set of conditions (e.g., based on age, density, species composition, or other features) that allow a single management treatment throughout

state agencies natural resource agencies of State governments

state land State-owned public land

state-listed species cf. "Federal-listed species"

step-down management plan a plan for dealing with specific refuge management subjects, strategies, and schedules, e.g., cropland, wilderness, and fire [FWS Manual 602 FW 1.4]

stopover habitat habitat where birds rest and feed during migration

strategy a specific action, tool, technique, or combination of actions, tools, and techniques for meeting unit objectives

strategic management the continual process of inventorying, choosing, implementing, and evaluating what an organization should be doing.

stratification thermal layering of water both in lakes and streams

structure the horizontal and vertical arrangement of trees and other vegetation having different sizes, resulting in different degrees of canopy layering, tree heights, and diameters within a stand.

succession the natural, sequential change of species composition of a community in a given area

surface water all waters whose surface is naturally exposed to the atmosphere, or wells or other collectors directly influenced by surface water

sustainable development the attempts to meet economic objectives in ways that do not degrade the underlying environmental support system. Note that there is considerable debate over the meaning of this term…we define it as "human activities conducted in a manner that respects the intrinsic value of the natural world, the role of the natural world in human well-being, and the need for humans to live on the income from nature's capital rather than the capital itself."

terrestrial living on land

territory an area over which an animal or group of animals establishes jurisdiction

thinning reducing the density of trees in a stand primarily to improve the growth and condition of residual trees and prevent mortality. The term describes treatments in immature even-aged stands that do not attempt to establish regeneration.

threatened species a Federal-listed, protected species that is likely to become an endangered species in all or a significant portion of its range

tiering incorporating by reference the general discussions of broad topics in environmental impact statements into narrower statements of environmental analysis by focusing on specific issues [40 CFR 1508.28]

tributary a stream or river that flows into a larger stream, river, or lake, feeding it water

trust resource a resource that the Government holds in trust for the people through law or administrative act

[N.b. A Federal trust resource is one for which responsibility is given wholly or in part to the Federal Government by law or administrative act. Generally, Federal trust resources are nationally or internationally important no matter where they occur, like endangered species or migratory birds and fish that regularly move across state lines. They also include cultural resources protected by Federal historic preservation laws, and nationally important or threatened habitats, notably wetlands, navigable waters, and public lands like state parks and national wildlife refuges.]

trust responsibility In the federal government, a special duty required of agencies to hold and manage lands, resources, and funds on behalf of Native American tribes.

turbidity refers to the extent to which light penetrates a body of water. Turbid waters are those that do not generally support net growth of photosynthetic organisms

understory the lower layer of vegetation in a stand, which may include short trees, shrubs, and herbaceous plants

uneven-aged a stand having three or more age classes of trees with distinctly different ages

unfragmented habitat large, unbroken blocks of a particular type of habitat

unit objective desired conditions that must be accomplished to achieve a desired outcome

[N.b. Objectives are the basis for determining management strategies, monitoring refuge accomplishments, and measuring their success. Objectives should be attainable, time-specific, and stated quantitatively or qualitatively (FWS Manual 602 FW 1.4).]

upland dry ground (i.e., other than wetlands)

urban runoff water from rain, melted snow, or landscape irrigation flowing from city streets and domestic or commercial properties that may carry pollutants into a sewer system or water body

vernal pool are a type of seasonal wetland formed by isolated depressions in the landscape that hold water in the winter and spring and are usually dry by midsummer or fall. There are no permanent surface connections to flowing water. Water sources include rainfall, snowmelt and elevated water tables. Although fish are usually absent, vernal pools in riparian floodplains may contain fish periodically. vernal pools are important breeding sites for amphibians. The woody debris and emergent grasses provide attachment sites for egg masses. (source: Mitchell, J.C., A.R. Breisch, and K.A. Buhlmann. 2006. Habitat Management Guidelines for Amphibians and Reptiles of the Northeastern U.S. Partners in Amphibian and Reptile Conservation, Technical Publication HMG-3, Montgomery, Alabama, 108 pp)

vision statement a concise statement of what the unit could achieve in the next 10 to 15 years

watchable wildlife program [N.b. A watchable wildlife program is one that helps maintain viable populations of all native fish and wildlife species by building an active, well informed constituency for conservation. Watchable wildlife programs are tools for meeting wildlife conservation goals while at the same time fulfilling public demand for wildlife-dependent recreational activities (other than sport hunting, sport fishing, or trapping).]

watershed the geographic area within which water drains into a particular river, stream, or body of water. A watershed includes both the land and the body of water into which the land drains.

watershed-wide education networks systems for sharing educational information, like curriculum development projects, student activities, and ongoing data gathering; a combination of telecommunications and real-life exchanges of information

well-protected in CCP analysis, a rare species or community type is considered well protected if 75 percent or more of its occurrence sites are on dedicated open space

wetlands lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. These areas are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted to life in saturated soil conditions.

"Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water."—Cowardin et al 1979

wilderness study areas lands and waters identified by inventory as meeting the definition of wilderness and being evaluated for a recommendation they be included in the Wilderness System (cf. "recommended wilderness")

[N.b. A wilderness study area must meet these criteria:

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

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

3. has at least 5,000 contiguous, roadless acres, or sufficient size to make practicable its preservation and use in an unimpaired condition.
(FWS Manual 610 FW 1.5 (draft)).]

wilderness cf. "designated wilderness"

wildfire a free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands [FWS Manual 621 FW 1.7]

wildland fire every wildland fire is either a wildfire or a prescribed fire [FWS Manual 621 FW 1.3]

wildlife-dependent recreational use a use of a national wildlife refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation (National Wildlife Refuge System Administration Act of 1966).

wildlife management manipulating wildlife populations, either directly by regulating the numbers, ages, and sex ratios harvested, or indirectly by providing favorable habitat conditions and alleviating limiting factors

wildlife-oriented recreation recreational activities in which wildlife is the focus of the experience

["The terms 'wildlife-dependent recreation' and 'wildlife-dependent recreational use' mean a use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation."—National Wildlife Refuge System Improvement Act of 1997]

working landscape the rural landscape created and used by traditional laborers

[N.b. Agriculture, forestry, and fishing all contribute to the working landscape of a watershed (e.g., keeping fields open by mowing or by grazing livestock).]

Acronyms

ABC	American Bird Conservancy
ACE	U.S. Army Corps of Engineers
ACJV	Atlantic Coast Joint Venture
AP	Atlantic Population (Canada geese)
ARPA	Archaeological Resources Protection Act of 1960
ATV	All-terrain vehicle
BCR	Bird Conservation Region
BENI	Beetles of Eastern Neck Island
BIDEH	Biological integrity, diversity, and environmental health
BMPs	Best Management Practices
CBF	Chesapeake Bay Foundation
CBFO	Chesapeake Bay Field Office
CBP	Chesapeake Bay Program
CCP	Comprehensive Conservation Plan
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CM	Chesapeake Marshlands
CRA	Chester River Associates
CWD	Chronic Wasting Disease
DFS	Delmarva Fox Squirrel
DHMH	(Maryland) Department of Health and Mental Hygiene
DU	Ducks Unlimited
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency

FIDs	Forest interior dwelling (neotropical migratory birds)
FOEN	Friends of Eastern Neck
FONSI	Finding of No Significant Impact
FTE	Full-time equivalent
FWS	U.S. Fish and Wildlife Service
GCN	Greatest Conservation Need
GIS	Geographic information system
GPS	Global positioning system
GS	General Schedule (federal government salary schedule)
GTR	Green tree reservoir
HAPS	Hazardous air pollutants
HMP	Habitat Management Plan
HQ	Headquarters
HSIMP	Habitat and Species Inventory and Monitoring Plan
IPCC	Intergovernmental Panel on Climate Change
ISFMP	Interstate Fisheries Management Program
MANEM	Mid-Atlantic/New England/Maritimes region
MBSS	Maryland Biological Stream Survey
MBTA	Migratory Bird Treaty Act
MDA	Maryland Department of Agriculture
MDDNR	Maryland Department of Natural Resources
MDE	Maryland Department of Energy
MHT	Mean high tide
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSU	Moist Soil Units
MWWS	Mid-winter waterfowl survey

NABCI	North American Bird Conservation Initiative
NAS	National Audubon Society
NAWCP	North American Waterbird Conservation Plan
NAWMP	North American Waterfowl Management Plan
NEPA	National Environmental Policy Act of 1969
NGO	Non-governmental organization
NHCR	National-State Agency Herptile Conservation Report
NHPA	National Historic Preservation Act of 1966
NMFS	National Marine Fisheries Service
NOA	Federal Register Notice of Availability
NOI	Federal Register Notice of Intent
NRCS	Natural Resources Conservation Service
NWR	National Wildlife Refuge
NWPS	National Wilderness Preservation System
NWRS	National Wildlife Refuge System
ORV	off-road vehicle
PARC	Partners in Amphibian and Reptile Conservation
PIF	Partners in Flight
PUNA	Public Use Natural Area
RNA	Research Natural Area
RONS	Refuge Operations Needs System
SAMMS	Service Asset Maintenance Management System
SAV	Submerged Aquatic Vegetation
SHPO	State Historic Preservation Office
SWG	State Wildlife Grant programs

TMDL	Total Maximum Daily Loads
TNC	The Nature Conservancy
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USACOE	U.S. Army Corps of Engineers
VIMS	Virginia Institute of Marine Science
VOC	Volatile organic compounds
WDCP	(Maryland) Wildlife Diversity Conservation Plan (aka Wildlife Action Plan)
WG	Wage grade
WIA	Wilderness inventory area
WIMS	Weed Information Management System
WQLS	Water Quality Limited Segments
WSA	Wilderness study area

USFWS

Tubby Cove boardwalk

Bibliography

Atlantic Coast Joint Venture (ACJV). 2005. Revised Waterfowl Implementation Plan, June 2005, Mid-Atlantic Region, Focus Area Description. Accessed at *http://www.acjv.org/resources.htm*.

Atlantic Coast Joint Venture (ACJV). 2009. Maryland Fact Sheet. Accessed at *http://www.acjv.org/documents/PDF's/MD_09_final.pdf*.

Atlantic States Marine Fisheries Commission (ASMFC). 2007. 2007 Review of the Fishery Management Plan in 2006 for Horseshoe Crab (Limulus polyphemus).Accessed at *http://www.asmfc.org/*

Atlantic States Marine Fisheries Commission (ASMFC). 1990. Fishery Management Plan for Atlantic Sturgeon: November 1990. Accessed at *http://www.asmfc.org/*.

Berggren, T.J. and J.T. Lieberman. 1978. Relative contribution of Hudson, Chesapeake and Roanoke striped bass, Morone saxatilis, stocks to the Atlantic coast fishery. Fish. Bull., U.S. 76:335-345.

Berman, M., Berquist, H., & Killeen, S., et al. 2006. Development of the Maryland Shoreline Inventory Methods and Guidelines for Kent County *prepared* by the Comprehensive Coastal Inventory Program, Center for Coastal Resources Management, Virginia Institute of Marine Science, College of William and Mary. Accessed at *http://ccrm.vims.edu/gis_data_maps/shoreline_inventories/maryland/kent/Kent%20County.pdf*

Brown, S., Hickey, C., Harrington, B., and R. Gill, Eds. 2001. United States Shorebird Conservation Plan, 2nd Edition prepared for Manoment Center for Conservation Sciences, Manoment, MA.

Bue, C.D. 1968. Monthly surface-water inflow to Chesapeake Bay: U.S. Geological Survey Open-File Report, Arlington, Va., October 1968, 45 p.

Caswell, D., J. Fuller, K. Gamble, J. Hansen, M. Huang, J. Johnson, T. Rothe, J. Serie, D. Sharp, and R. Trost. 2007. A Management Plan for the Eastern Population of Tundra Swans prepared by the Ad Hoc Eastern Population Tundra Swan Committee.

Chesapeake Bay Foundation (CBF). 2007. Climate Change and the Chesapeake Bay: Challenges, Impacts, and the Multiple Benefits of Agricultural Conservation Work. Accessed at *http://www.cbf.org/site/DocServer/climatechange.pdf?docID=9423*.

The Chesapeake Bay Mute Swan Working Group (CBMSWG). 2004. Mute Swam (Cygnus olor) in the Chesapeake Bay: A Bay-Wide Management Plan.

Chesapeake Bay Program (CBP). 1999. The State of the Chesapeake Bay: A Report to the Citizens of the Bay Region. Accessed at: *http://www.chesapeakebay.net/pubs/sob/index.html*Chesapeake Bay Program (CBP). 2000. Chesapeake Bay Journal: Tundra swans en route to winter home on Chesapeake - November 2000 Bay Naturalist prepared by Kathy Reshetiloff.

Chesapeake Bay Program (CBP). 2007. Fish and Shellfish. Accessed at *http://www.chesapeakebay.net/status_fishshellfish.aspx?menuitem=19682*.

Chesapeake Bay Program (CBP). 2007. Chesapeake Bay: 2006 Health and Restoration Assessment. *http://www.chesapeakebay.net/content/publications/cbp_26038.pdf*

Chesapeake Bay Program (CBP). 2008. Phragmites. Accessed at *http://www.chesapeakebay.net/phragmites.aspx?menuitem=16943*.

Chesapeake Bay Program (CBP). 2009a. Bay Watershed Population and Impervious Surface. Accessed at *http://www.chesapeakebay.net/status_population.aspx?menuitem=19794*.

Chesapeake Bay Program (CPB). 2009b. Physical Properties. Accessed at http://www.chesapeakebay.net/physicalcharacteristics.aspx?menuitem=14657.

Chester River Association (CRA). 2006. CRA Currents. Volume 16. Accessed at *http://www.chesterriverassociation.org/publications/2006_CURRENTS.pdf*.

Critical Area Commission for the Chesapeake and Atlantic Coastal Bays (CAC). 2001. A Guide to the Conservation of Forest Interior Dwelling Birds in the Chesapeake Bay Critical Area prepared by Jones,C, J. McCann, & S McConville.

Cronin, W. B. 2005. The Disappearing Islands of the Chesapeake. Johns Hopkins University Press. 200 pp.

Davis, C. & L. Hindman, eds. 2008. A Management Plan for the Atlantic Population of Canada Geese prepared by the Canada Goose Committee. Atlantic Flyway Council Game Bird Technical Section.

Dettmers, R. 2006. Personal communication with Randy Dettmers, United States Fish and Wildlife Service Migratory Bird Program.

Dettmers, R. 2007. Personal communication with Randy Dettmers, U.S. Fish and Wildlife Service.

Funderburk, S.L., J.A. Musk, S.J. Jordan, and D.Riley. 1991. Habitat Requirements for Chesapeake Bay Living Resources. Revised Edition. U.S. EPA Special Report. 428 pp.

Harvey, W. 2009. Personal Communication with Bill Harvey, Maryland Department of Natural Re.sources.

Hilderbrand, R.H., R.H. Gardner, M.J. Ratnaswamy, and C.E. Keller. 2007. Evaluating population persistence of Delmarva fox squirrels and potential impacts of climate change. Biological Conservation.137, 70-77.

Hindman, L.J. 2008. Personal communications. Maryland Department of Natural Resources.

Holiday, M.C. and B.K. O'Bannon. 1997. Fisheries of the United States, 1996. Current Fisheries Statistics No. 9600. National Oceanic and Atmospheric Administration/National Marine Fisheries Service, Washington, D.C.

Intergovernmental Panel on Climate Change (IPCC). 2007. A report of Working Group I of the IPCC: Summary for Policymakers.

Jones, C., J McCann, and S. McConville. 2000. A Guide to the Conservation of Forest Interior Dwelling Birds in the Chesapeake Bay Critical Area. Accessed at *http://www.dnr.state.md.us/education/envirothon/wildlife/criticalareareg_FIDS.pdf*.

Keller, C. 2006. Personal communication with C. Keller, U.S. Fish and Wildlife Service, Chesapeake Bay Field Office. October 17, 2006 email to Nancy McGarigal.

Kent County Parks & Recreation (KCPR). 2009. Kent County Parks & Recreation Facilities. Accessed at *http://www.kentparksandrec.org/facilities.php*.

Kent County Department of Planning and Zoning (KCDPZ). 2006. Comprehensive Plan. Accessed at *http://www.kentcounty.com/gov/planzone/compplan.htm*.

Kent County, Maryland (KCMD). 2006. Comprehensive Plan: Kent County, Maryland, May 2006. Accessed at *http://www.kentcounty.com/gov/planzone/Draft%20CP/CompPlan.pdf*.

Kushlan, J.A., M.J. Steinkamp, K.C. Parsons, J. Capp, M.A. Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliot, R.M. Erwin, S. Hatch, S. Kress, R. Milko, S. Miller, K. Mills, R. Paul, R. Phillips, J.E. Saliva, B. Sydeman, J. Trapp, J. Wheeler, and K. Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas, Washington, DC, U.S.A. 78 pp. Accessed at *http://www.waterbirdconservation.org/nawcp.html*.

Lippson, A.J. and R.L. Lippson. 1984. Life in the Chesapeake Bay. Johns Hopkins University Press, MD. 324 p.

Litwiler, T.L. 2001. "*Conservation plan for sea turtles, marine mammals, and the shortnose sturgeon in Maryland* ," Maryland Department of Natural Resources Technical Report FS-SCOL-01-2, Oxford, Maryland. 134 pp.

Maryland Critical Area Commission (MD CAC). 2007. Living Shorelines: A guide for waterfront property owners. Accessed at *http://www.dnr.state.md.us/criticalarea/guidancepubs/Living shorelines-FN.pdf*

Maryland Department of the Environment (MDE). 2007. MDE 1999 Data Report: Maryland's Upper Eastern and Western Shores. Upper Western and Upper Eastern Shores Document Version: March 8, 2007. Accessed at *http://www.mde.maryland.gov/assets/document/UWS_UES_databook2_final_040407.pdf*.

Maryland Department of Natural Resources (MD DNR). 2003a. **Mute Swans in Maryland: A Statewide Management Plan prepared by** Maryland Department of Natural Resources, Wildlife and Heritage Service. Accessed at *http://www.dnr.state.md.us/wildlife/finalmsplan.pdf*.

Maryland Department of Natural Resources (MD DNR). 2003b. Maryland's Strategic Forest Lands Assessment. Accessed at *http://www.dnr.state.md.us/forests/download/sfla_report.pdf*.

Maryland Department of Natural Resources (MD DNR). 2005. Maryland Wildlife Diversity Conservation Plan. Accessed on April 2008 at: *http://www.dnr.state.md.us/wildlife/divplan_wdcp.asp*.

Maryland Department of Natural Resources (MD DNR). 2007. DNR Answers Questions about Sea Level Rise In Response to IPCC Report . Accessed on April 2008 at: *http://www.dnr.state.md.us/dnrnews/infocus/sealevel_rise.asp*.

Maryland Department of Planning. 2000. Estimates: Projections by Type for all Counties. Accessed at *http://www.mdp.state.md.us/msdc/dw_popproj.htm#*

McWhorter, C.G. 1981. Johnsongrass as a weed. USDA Farmers. Bulletin 1537. 19 p.

National Audubon Society (NAS). 2004. Tundra Swan: *Cygnus columbianus*. Accessed at *http://web1.audubon.org/waterbirds/species.php?speciesCode=tunswa&tab=conStatus*.

National Wildlife Federation (NWF). 2008. Sea-Level Rise and Coastal Habitats in the Chesapeake Bay Region, Technical Report: May 2008 prepared by P. Glick, J. Clough and B. Nunley. Accessed at *http://www.nwf.org/sealevelrise/pdfs/FullSeaLevelRiseandCoastalHabitats_ChesapeakeRegion.pdf*.

National Wildlife Refuge Association (NWRA). 2002. Silent Invasion – A Call to Action. Accessed at *http://www.refugenet.org/new-pdffiles/Silent%20Invasion%20pdf.pdf*.

Natural Resources Conservation Service (NRCS). 2006. Conservation Resource Brief: Chesapeake Bay and Agriculture October 2006, Number 0609. Accessed at *http://www.nrcs.usda.gov/feature/chesapeakebay/chesapeake_bay_conservation_resource_brief.pdf*.

Northeast Climate Impacts Assessment (NECIA). 2007. Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions. Accessed at http://www.climatechoices.org/assets/documents/climatechoices/executive-summary-necia.pdf.

Offshore and Coastal Technologies. 1991. As cited in Chesapeake Marshland Comprehensive Conservation Plan, United States Fish and Wildlife Service, 2006.

Ortyl, K. 2007. Field Review and Inventory: Eastern Neck National Wildlife Refuge, United States Fish and Wildlife Service.

Partners in Amphibian and Reptile Conservation (PARC). 2004. 2004 National-State Wildlife Agency Herpetological Conservation Report. Accessed at *http://www.parcplace.org/documents/PARCNationalStates2004.pdf*.

Partners in Flight (PIF). 1999. Partners in Flight: Mid-Atlantic Coastal Plain Bird Conservation Plan (Physiographic Area #44) VERSION 1.0, April 1999. American Bird Conservancy.

Persson, A. 1998. How Do We Understand the Coriolis Force? Bulletin of the American Meteorological Society, 79, 1373-1385.

Ramsar. 1971. Ramsar Convention on Wetlands 1971. International Convention signed in 1971 in Ramsar Iran. Ramsar Convention Secretariat, Gland, Switzerland.

Ramsar Convention. 2007. The List of Wetlands of International Importance, 23 April 2007. Accessed at *http://ramsar.org/key_guide_list2006_e.htm#III*.

Reshetiloff, K., ed., 1995. Chesapeake Bay, Introduction to an Ecosystem: Annapolis, Maryland. Chesapeake Bay Program, U.S. Environmental Protection Agency.

Reshetiloff, K. 2006. Autumn's gold includes millions of monarchs migrating south.

Bay Journal, September 2006, Vol.16 – No. 6.

Rich, T.D., C.J. Beardmore, H. Berlanga, P.J. Blancher, M.S.W. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter, E.E. Iñigo-Elias, J.A. Kennedy, A.M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt, T.C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, NY.

Rosenberg, K.V., R.S. Hames, R.W. Rohrbaugh, Jr., S. Barker Swarthout, J.D. Lowe, and A.A. Dhondt. 2003. A land manager's guide to improving habitat for forest thrushes. The Cornell Lab of Ornithology. Accessed at *http://www.birds.cornell.edu/conservation/thrush/thrushguide.pdf*.

Roth, R.R., M.S. Johnson, and T.J. Underwood. 1996. Wood Thrush (*Hylocichla mustelina*). *In* A. Poole and F. Gill, editors. The birds of North America, Number 246. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA.

Serie, J and L.J. Hindman, 1997. Atlantic Population of Canada Geese Status and Management. Accessed on April 2008 at: *http://www.fws.gov/migratorybirds/issues/cangeese/apcangse.html*.

Singewald, J.T. 1946. Mineral resources of Carroll and Frederick Counties. Pages 132-162 in The Physical features of Carroll County and Frederick County, Maryland Geological Survey.

Southwick Associates. 1995. The Economic Contributions of Bird and Waterfowl Recreation in the United States During 1991. Southwick Associates. Arlington, VA.

Tatu, K.S., J.T. Anderson, L.J. Hindman, and G. Seidel. 2007. Impact of mute swan herbivory on submerged aquatic vegetation in the Chesapeake Bay. Journal of Wildlife Management 71(5):1431-1439.

The Nature Conservancy (TNC). 2001. Species Management Abstract: Eastern Wood-Pewee (Contopus virens). The Nature Conservancy, Arlington, VA.

The Nature Conservancy (TNC). 2006. North Atlantic Coast Ecoregional Assessment.

United States Army Corps of Engineers (USACOE). 1986. As cited in Chesapeake Marshland Comprehensive Conservation Plan, United States Fish and Wildlife Service, 2006.

United States Census Bureau (USCB). 2006. Census Estimates, Kent County MD. Accessed at *http://quickfacts.census.gov/qfd/states/24/24029.html*.

United States Environmental Protection Agency (EPA). 2002. The State of the Chesapeake Bay, A Report to the Citizens of the Bay Region. Chesapeake Bay Program Report: EPA 903-R-02-002. 60 pp.

United States Environmental Protection Agency (EPA). 2006. Chesapeake Bay Program, Annapolis, MD. Grant No. CB973219-010.

United States Environmental Protection Agency (EPA). 2008. Climate Change, Wildlife and Wildlands Case Study: Chesapeake Bay and Assateague Island. Accessed on 4/29/2009 at *http://www.epa.gov/climatechange/wycd/downloads/CS_Ches.pdf*.

United States Environmental Protection Agency (EPA). 2009. America's wetlands: Our vital link between land and water. Accessed at *http://www.epa.gov/OWOW/wetlands/vital/toc.html*.

United States Fish and Wildlife Service (USFWS). 1982. Chesapeake Bay Bald Eagle (Haliaeetus leucocephalus) Recovery Plan. Accessed at *http://ecos.fws.gov/docs/recovery_plan/0604191.pdf*.

United States Fish and Wildlife Service (USFWS). 1988. Eastern Neck Refuge Station Management Plan.

United States Fish and Wildlife Service (USFWS) 2002a. Birds of conservation concern 2002. Division of Migratory Bird Management, Arlington, Virginia. 99 pp.

United States Fish and Wildlife Service (USFWS). 2002b. Conserving America's Fisheries, Fisheries Program Vision for the Future. Accessed at *http://www.fws.gov/fisheries/caf/Vision.htm*.

United States Fish and Wildlife Service (USFWS). 2003a. Eastern Neck NWR Annual Narrative.

United States Fish and Wildlife Service (USFWS). 2003b. The National Strategy for Management of Invasive Species for the National Wildlife Refuge System prepared by the National Invasive Species Management Strategy Team, USFWS. Accessed at *http://www.fws.gov/invasives/pdfs/NationalStrategyFinalRevised05-04.pdf*.

United States Fish and Wildlife Service (USFWS). 2004a. Mute Swan (Cygnus olor) in the Chesapeake Bay: A Bay-wide Management Plan prepared by Chesapeake Bay Mute Swan Working Group, Chesapeake Bay Field Office, United States Fish and Wildlife Service. Accessed at *http://www.dnr.state.md.us/wildlife/download/Mute_Swan_Chesapeake_Bay_Plan_2005.pdf*.

United States Fish and Wildlife Service (USFWS). 2004b. Writing Refuge Management Goals and Objectives: A Handbook. Accessed at *http://www.fws.gov/refuges/policiesandbudget/pdfs/WritingRefugeGoals_022504.pdf*.

United States Fish and Wildlife Service (USFWS). 2005. Final Environmental Impact Statement: Resident Canada Goose Management *prepared* by the Division of Migratory Bird Management, U.S. Fish and Wildlife Service. Accessed at *http://www.fws.gov/migratorybirds/issues/cangeese/finaleis.htm*

United States Fish and Wildlife Service (USFWS). 2006a. Chesapeake Marshlands National Wildlife Refuge Complex Comprehensive Conservation Plan and Environmental Assessment.

United States Fish and Wildlife Service (USFWS). 2006b. Eastern Neck NWR: Raptors List. Unpublished tabulated listing.

United States Fish and Wildlife Service (USFWS). 2006c. Eastern Neck National Wildlife Refuge complete bird list. Accessed at *http://www.fws.gov/northeast/easternneck/ENNWR_BIRDS.pdf*.

United States Fish and Wildlife Service (USFWS). 2007a. Eastern Neck National Wildlife Refuge History: Quieter Times. Accessed at *http://www.fws.gov/northeast/easternneck/history.html*.

United States Fish and Wildlife Service (USFWS). 2007b. New England/Mid-Atlantic Coast Bird Conservation Region (BCR 30) Implementation Plan *prepared by* Melanie Steinkamp, Atlantic Coast Joint Venture. Accessed at http://www.acjv.org/BCR_30/BCR30_June_23_2008_final.pdf.

United States Fish and Wildlife Service (USFWS). 2007c. Banking on Nature Report 2006: Economic Benefits to Local Communities of National Wildlife Refuge Visitation prepared by Erin Carver and James Caduill, Division of Economics, U.S. Fish and Wildlife Service. Accessed at *http://www.fws.gov/refuges/about/pdfs/BankingOnNature2006_1123.pdf*

United States Fish and Wildlife Service (USFWS). 2007d. 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: State Overview. Accessed at *http://www.census.gov/prod/2008pubs/fhw06-nat.pdf*.

United States Fish and Wildlife Service (USFWS). 2007d. Early Detection and Response Plan for Occurrence of Highly Pathogenic Avian Influenza in Wild Birds. U.S. Department of the Interior, Fish and Wildlife Service, July 17, 2007 Edition.

United States Fish and Wildlife Service (USFWS). 2007e. Bald Eagle Management Guidelines. National Bald Eagle Management Guidelines prepared by Division of Migratory Bird Management, U.S. Fish and Wildlife Service. Accessed at *http://www.fws.gov/pacific/eagle/NationalBaldEagleManagementGuidelines.pdf*.

United States Fish and Wildlife Service (USFWS). 2008a. Birds of conservation concern 2008 prepared by Division of Migratory Bird Management, U.S. Fish and Wildlife Service, Arlington, Virginia. Accessed at *DNR 2008/BCC2008.pdf*.

United States Fish and Wildlife Service (USFWS). 2008b. Economic Impact of Waterfowl Hunting in the United States: Addendum to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Accessed at *http://library.fws.gov/Pubs/nat_survey2006_waterfowlhunting.pdf*.

United States Fish and Wildlife Service Chesapeake Bay Field Office (CBFO). 2007. Delmarva Peninsula Fox Squirrel (Sciurus niger cinereus) 5-Year Review: Summary and Evaluation prepared by Chesapeake Bay Field Office. Accessed at *http://www.fws.gov/ChesapeakeBay/pdf/5-yearSummary.pdf*.

United States Fish and Wildlife Service and the Canadian Wildlife Service (USFWS, CWS). 1993. Final Draft-Strategic Plan, April 1993, Black Duck Joint Venture.

United States Fish and Wildlife Service and Maryland Fishery Resources Office (USFWS & MDFRO). 2006. Fish species of interest that occur in the vicinity of Eastern Neck National Wildlife Refuge. Unpublished report compiled by U.S. Fish and Wildlife Service and Maryland Fishery Resources Office 11/07/2006.

United States Fish and Wildlife Service and National Park Service. (USFWS & NPS). 2002. Plant Invaders of Mid-Atlantic Natural Areas prepared by Chesapeake Bay Field Office, U.S. Fish & Wildlife Service. Accessed at *http://www.invasive.org/eastern/midatlantic/*.

Virginia Institute of Marine Science (VIMS). 1977. Accomack County Tidal Marsh Inventory prepared by G. M. Silberhorn and A. F. Harris. Accessed at *http://ccrm.vims.edu/publications/tidal_marsh_inventories.html*

Virginia Institute of Marine Science (VIMS). 1999. Distribution of submerged aquatic vegetation in Chesapeake Bay *prepared by* Orth, R.J., D.J. Wilcox, L.S. Nagey, J.R. Whiting, and J.R. Fishman. 2000. *1999 Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Coastal Bays*. VIMS Special Scientific Report Number 141. Final report to U.S. EPA, Chesapeake Bay Program, Annapolis, MD. Grant No.CB993777-02-0, http://www.vims.edu/bio/sav/sav99.

Virginia Institute of Marine Science (VIMS). 2005. Distribution of submerged aquatic vegetation in the Chesapeake Bay. R. J. Orth, D. J. Wilcox, L. S. Nagey, A. L. Owens, J. R. Whiting, and A. Kenne. VIMS Special Scientific Report Number 147. Final Report to U.S. Accessed at *http://www.vims.edu/bio/sav/sav05*

Watts, B. D. 1999. Mid-Atlantic Coastal Plain bird conservation plan (physiographic area #44). 81 p. Available from: http:\\www.partnersinflight.org.

Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2007. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.

Appendix A

John Mosesso, Jr./NBII

Snowy egret

Species of Conservation Concern at Eastern Neck Refuge

Table A.1. Birds of Conservation Concern at Eastern Neck Refuge

Common Name	Breed	FWS BCC 2008, Region 5	Atlantic Coast Joint Venture BCR 30	PIF 1999, Area 44	MD Birds GCN 2005	FIDS list for Chesapeake Area	Spring	Summer	Fall	Winter
WATERBIRDS										
King Rail	X		M	Ib	X		c	c	c	c
American Bittern	X	X	M	II	X		r	u	u	r
Least Bittern	X		M	II	X		u	u		
Great Blue Heron	X			V	X		c	c	c	u
Pied-billed Grebe	X	X		V	X		u	r	c	u
Least Tern		X	H	II	ST		r	u	u	
Common Tern			M		X		u	u	u	
Clapper Rail			H	Ib			r	r	r	
Glossy Ibis			H	V	X			r	r	
Forster's Tern			H	V	X		r	o	c	
Horned Grebe		X	H		X		u		c	u
Royal Tern			M	V	SE		r		u	
Little Blue Heron			M	V	X		r	r	r	
Tricolored Heron			M	V	X		r	r	o	
Yellow-crowned Night-Heron			M	V	X		r	r	r	
Snowy Egret		X	M		X		u	c	c	
Black-crowned Night-heron			M		X		r	u	u	r
Sora			M				u		u	u
Brown Pelican				Ib	X		r	r	r	
Great Egret				V	X		o	o	u	
Common Moorhen				V	X		r	r	r	
Caspian Tern				V			u		u	
Laughing Gull					X		c	u	c	r
Common Loon					X		u			
WATERFOWL										
American Black Duck	X		HH	Ib	X		c	c	c	c
Mallard	X		H				a	a	a	a

Common Name	Breed	FWS BCC 2008, Region 5	Atlantic Coast Joint Venture BCR 30	PIF 1999, Area 44	MD Birds GCN 2005	FIDS list for Chesapeake Area	Spring	Summer	Fall	Winter
Canada Goose			HH				a		a	a
Canvasback			H		X		c		c	c
Bufflehead			H				c		c	c
Greater Scaup			H				u		u	c
Lesser Scaup			H				c		c	c
Black Scoter			H				u		u	u
Surf Scoter			H				u		u	u
Tundra Swan			H				c		a	a
White-winged Scoter			H				u		u	u
Ruddy Duck			M		X		u		c	c
Wood duck			M				c	c	c	u
American Wigeon			M				u		c	c
Green-winged Teal			M				c		c	r
Common Goldeneye			M				a		c	a
Hooded Merganser			M				u		o	u
Red-breasted Merganser			M				u		r	u
Gadwall			M				c	r	c	c
Northern Pintail			M				c		c	c
Brant					X				r	r
SHOREBIRDS										
American Woodcock	X		HH		X		c	u	c	u
Killdeer	X		M				c	c	c	u
Ruddy Turnstone			HH		X				r	
Sanderling			HH		X				r	r
Black-bellied Plover			H		X		u	u	u	
Greater Yellowlegs			H		X		c	c	c	

Common Name	Breed	FWS BCC 2008, Region 5	Atlantic Coast Joint Venture BCR 30	PIF 1999, Area 44	MD Birds GCN 2005	FIDS list for Chesapeake Area	Spring	Summer	Fall	Winter
Solitary Sandpiper		X	H		X		u	u	u	
Semipalmated Sandpiper		X	H		X		c	c	c	
Dunlin			H		X		c	u	c	r
Short-billed Dowitcher		X	H		X		u	u	u	
White-rumped Sandpiper			H					u	u	
Semipalmated Plover			M				u	u	u	
Lesser Yellowlegs		X	M				c	u	c	
Spotted Sandpiper			M				c	u	c	
Western Sandpiper			M				r	r	r	
Least Sandpiper			M				c	c	c	r
Common Snipe			M				u		u	u
LANDBIRDS										
Wood Thrush	X	X	HH	Ib	X	X	c	c	u	
Prairie Warbler	X	X	HH	Ib	X		u	u	u	
Seaside Sparrow	X	X	HH	Ib	X		r	r	r	r
Kentucky Warbler	X	X	H	Ib	X	X	u	o	u	
Whip-poor-will	X	X	H		X	X	u	u	c	
Sedge Wren	X	X	M	Ib	SE		o	o	o	r
Henslow's Sparrow	X	X	M	Ib	ST		r	r	r	
Prothonotary Warbler	X		H	Ib	X	X	u	u	u	
Louisiana Waterthrush	X		H	Ib	X	X	u	r	u	
Yellow-throated Vireo	X		H	Ib	X	X	u	u	u	
Northern Bobwhite	X		H	II	X		c	c	c	c
Brown Thrasher	X		H	II	X		c	c	c	o

Common Name	Breed	FWS BCC 2008, Region 5	Atlantic Coast Joint Venture BCR 30	PIF 1999, Area 44	MD Birds GCN 2005	FIDS list for Chesapeake Area	Spring	Summer	Fall	Winter
Eastern Towhee	X		H	II	X		c	c	c	u
Field Sparrow	X		H	II	X		c	c	c	c
Chimney Swift	X		H	II			c	c	c	
Marsh Wren	X		H		X		c	c	c	r
Black-and-white Warbler	X		H			X	c	r	c	
Baltimore Oriole	X		H				c	u	u	r
Northern Flicker	X		H				c	c	c	c
Great Crested Flycatcher	X		H				u	c	u	
Eastern Kingbird	X		H				c	c	c	
Grasshopper Sparrow	X		M	II	X		u	u	u	
Gray Catbird	X		M	II			c	c	c	o
Acadian Flycatcher	X			Ib	X	X	u	u	u	
Eastern Wood-Pewee	X			Ib			c	c	c	
White-eyed Vireo	X			Ib			c	u	c	
Scarlet Tanager	X			II	X	X	c	o	c	
Carolina Chickadee	X			II			c	c	c	c
Yellow-breasted Chat	X			II			u	u	u	r
Northern Parula	X				X	X	c	u	u	
Ovenbird	X				X	X	u	u	c	
Hairy Woodpecker	X				X	X	u	u	u	u
Red-eyed Vireo	X				X	X	c	u	c	
Black-billed Cuckoo	X				X		o	o	o	
Common Nighthawk	X				X		u	u	c	
Golden-crowned Kinglet	X				X		u		c	c

Common Name	Breed	FWS BCC 2008, Region 5	Atlantic Coast Joint Venture BCR 30	PIF 1999, Area 44	MD Birds GCN 2005	FIDS list for Chesapeake Area	Spring	Summer	Fall	Winter
Eastern Meadowlark	X				X		c	c	a	c
Summer Tanager	X				X		r	o	r	
Bay-breasted Warbler		X	H				u		u	
Red-headed Woodpecker		X	M	II	X		r	r	r	r
Loggerhead Shrike		X	M	V	SE		r		r	r
Canada Warbler		X	M		X		o		o	
Blue-winged Warbler		X	HH	Ib	X		u		u	
Rusty Blackbird		X	H				o		u	o
Blackburnian Warbler			M		ST		u		u	
Chuck-will's Widow				III	X		u	u	r	
Cliff Swallow				V	X		r		r	
Savannah Sparrow				V	X		u		u	u
Bobolink				V	X		u			
Bank Swallow				V			u	u	u	
Mourning Warbler					SE		r		o	
Veery					X	X	u		u	
Black-throated Green Warbler					X	X	u		u	
American Redstart					X	X	c	r	c	
Brown Creeper					X	X	u		u	u
Yellow-bellied Sapsucker					X		u		u	u
Swainson's Thrush					X		c		c	
Hermit Thrush					X		u		u	u
Nashville Warbler					X		r		r	
Chestnut-sided Warbler					X		u		u	

Common Name	Breed	FWS BCC 2008, Region 5	Atlantic Coast Joint Venture BCR 30	PIF 1999, Area 44	MD Birds GCN 2005	FIDS list for Chesapeake Area	Spring	Summer	Fall	Winter
Magnolia Warbler					X		u		u	
Black-throated Blue Warbler					X		u		c	
Northern Waterthrush					X		u		u	
Red-breasted Nuthatch					X		u		u	u
Winter Wren					X		u		u	u
Vesper Sparrow					X		r	r	r	r
Dark-eyed Junco					X		a		a	a
RAPTORS										
Bald Eagle	X	X	M	V	S T, FT X		c	u	c	u
Common Barn Owl	X			II	X		u	u	u	u
Red-shouldered Hawk	X			V	X	X	u	u	u	u
Barred Owl	X			V	X	X	u	u	u	u
Osprey	X			V			a	a	c	
Short-eared Owl		X		V	SE		o		o	o
Peregrine Falcon		X		V	X				o	
Broad-winged Hawk			H		X	X	o		c	
American Kestrel				II			a	u	a	a
Northern Harrier				V	X		c		c	c
Cooper's Hawk				V			o		o	o
Sharp-shinned Hawk					X		u		c	u
Golden Eagle					X		r		r	r
Northern Saw-whet Owl					X				r	r

Sources: ACJV, 2008; PIF, 1999; USFWS, 2008; MD DNR, 2005.

Legend:

BCR 30:
HH = Highest Priority
H = High Priority
M = Moderate Priority

PIF:
I = High overall (global) priority
II = High physiographic area priority
III = Additional Watch List
IV = Area responsibility
V = Additional listed
VI = Local concern

Maryland's codes:
ST = State threatened
SE = State endangered

Season
Sp – Spring – March to May
S – Summer – June to August
F – Fall – September to November
W – Winter – December to February

Relative Abundance
a – abundant: a species which is very numerous
c – common: likely to be seen or heard in suitable habitat
u – uncommon: present, but not certain to be seen
o – occasional: seen only a few times during a season
r – rare: may be present but not every year

FWS BCC 2008 Species: U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. United States Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, VA. Available online at *http://www.fws.gov/migratorybirds*

Table A.2. Mammals of Eastern Neck NWR

Common Name	Latin Name
Beaver	*Castor canadensis*
Delmarva Fox Squirrel	*Scuirus niger cinereous*
Eastern Cottontail	*Sylvilagus floridanus*
Eastern Gray Squirrel	*Sciurus carolinensis*
Ground Hog	*Marmota monax*
House Mouse	*Mus musculus*
Least Shrew	*Cryptotis parva*
Little Brown Bat	*Myotis lucifugus*
Meadow Vole	*Microtus pennsylvanicus*
Mole	*Talpa*
Muskrat	*Ondatra zibethica*
Opossum	*Didelphis marsupialis*
Raccoon	*Procyon lotor*
Red Fox	*Vulpes fulva*
Rice Rat	*Oryzomys palustris*
River Otter	*Lutra canadensis*
Southern Flying Squirrel	*Glaucomys volans*
White-footed Mouse	*Peromyscus leucopus*
White-tail Deer	*Odocoileus virginianus*

Table A.3. Amphibians and Reptiles of Eastern Neck NWR (GCN in bold)

Common Name	Latin Name
AMPHIBIANS	
American Toad	*Anaxyrus americanus*
Bull Frog	*Lithobates catesbeiana*
Fowlers Toad	*Anaxyrus fowleri*
Southern Leopard Frog	*Lithobates sphenocephala*
Spring Peeper	*Pseudacris crucifer*
Wood Frog	*Lithobates sylvatica*

REPTILES	
Black Rat Snake	*Elaphe obsoleta*
Common Five-lined Skink	*Eumeces fasciatus*
Common Garter Snake	*Thamnophis sirtalis*
Eastern Box Turtle	***Terrapene carolina***
Eastern King Snake	*Lampropeltis getulus*
Eastern Mud Turtle	*Kinsoternon subrubrum*
Eastern Painted Turtle	*Chrysemys picta*
Eastern Ribbon Snake	*Thamnophis sauritus*
Eastern Worm Snake	*Carphophis amoenus*
Northern Black Racer Snake	*Coluber constrictor*
Northern Diamondback Terrapin	***Malaclemys terrapin***
Northern Water Snake	*Nerodia sipedon*
Red-Bellied Slider	*Chrysemys rubriventris*
Rough Green Snake	*Ophoedrys aestivus*
Snapping Turtle	*Chelydra serpentine*
Southern Ringneck Snake	*Diadophis punctatus*
Stinkpot Turtle	*Sternotherus odoratus*

Table A.4. Interjurisdictional Fish of Eastern Neck NWR Waters

Common Name	Location	Type*	Details
Alewife	Chesapeake Bay; Chester River (spawning)	A, IJ	
American eel	Chesapeake Bay; Chester River	C, IJ	Petitioned for listing under ESA; USFWS sponsors fish passage projects for eel in the Chester River
American shad	Chester River	A, IJ	
Atlantic menhaden	Chester River; Upper River (nursery); Lower River (adult concentration area)		Area surrounding refuge provides juvenile habitat
Atlantic sturgeon	Chesapeake Bay; Chester River	A, IJ	Species of Concern status is under review; no known spawning in the Chester River
Blueback herring	Chesapeake Bay; Chester River (nursery, spawning)	A. IJ	
Hickory shad	Chesapeake Bay; Chester River (nursery, spawning)	A. IJ	
Shortnose sturgeon	Chesapeake Bay	A, IJ	Protected by the ESA
Striped bass	Chesapeake Bay; Chester River (nursery, spawning)	A, IJ	
Yellow perch	Upper Chester River (spawning southeast of refuge)		

*A = *anadromous*
C = *catadromous*
IJ = *Interjurisdictional Species*

FISH SPECIES OF INTEREST THAT OCCUR IN THE VICINITY OF EASTERN NECK NATIONAL WILDLIFE REFUGE

Compiled by U.S. Fish and Wildlife Service
Maryland Fishery Resources Office
11/07/2006

*****This is NOT a complete list of aquatic species that may be found in the vicinity of Eastern Neck National Wildlife Refuge***

FISH SPECIES

Alewife

- *Alosa pseudoharengus*
- Anadromous and interjurisdictional
- Occur in Chesapeake Bay and Chester River
  - Spawn in Chester River
  - Chester River provides nursery habitat

American eel

- *Anguilla rostrata*
- petitioned for listing under ESA
- catadromous and interjurisdictional
- coastal population is centered around the Chesapeake Bay
- occur in Chesapeake Bay and Chester River
  - USFWS sponsored fish passage projects for eel in Chester River

American shad

- *Alosa sapidissima*
- Anadromous and interjurisdictional
- Occur in the Chester River
  - Spawn in Chester River
  - Chester River provides nursery habitat

Atlantic menhaden

- *Brevoortia tyrannus*
- Found in Chester River
  - Upper River serves as nursery area
  - Area surrounding refuge provides juvenile habitat
  - Lower River serves as an adult concentration area

Atlantic sturgeon

- *Acipenser oxyrhinchus*
- Species of Concern status (ESA)—currently undergoing a status review
- Anadromous and interjurisdictional
- Occur in the Chesapeake Bay
  - Several captured at mouth of Chester River
    - One caught just south of Eastern Neck Island
    - All captures were juvenile fish
    - No known spawning in the Chester River

Blueback herring

- *Alosa aestivalis*
- Anadromous and interjurisdictional
- Occur in Chesapeake Bay and Chester River
  - Spawn in Chester River
  - Chester River provides nursery habitat

Hickory shad

- *Alosa mediocris*
- Anadromous and interjurisdictional
- Occur in Chesapeake Bay and Chester River
  - Spawn in Chester River
  - Chester River provides nursery habitat

Shortnose sturgeon

- *Acipenser brevirostrum*
- Endangered species status (ESA)
- Anadromous and interjurisdictional
- Occur in the Chesapeake Bay
  - Nearest capture locations
    - western side of Kent Island
    - just west of Rock Hall

Striped bass

- *Morone saxatilis*
- Anadromous and interjurisdictional
- Occur in Chesapeake Bay and Chester River
  - Spawn in Chester River
  - Chester River provides nursery habitat

Yellow perch

- *Perca flavescens*
- Spawning and nursery habitat in the upper Chester River
  - Spawning area located southeast of Refuge on Chester River

OTHER AQUATIC SPECIES

American oyster

- *Crassostrea virginica*
- Occur in the Chester River
  - Oyster bars on the eastern side of the refuge

Blue crab

- *Callinectes sapidus*
- Interjurisdictional
- Occur in the Chester River
  - Low density winter distribution on southern side of refuge
  - High density summer distribution surrounding the refuge
  - Low density summer spawning activity surrounding the refuge

Horseshoe crab

- *Limulus polyphemus*
- Interjurisdictional
- Spawning reported on southern tip of Eastern Neck Refuge
  - Some evidence to suggest an entrained population in the Chester River

Diamondback terrapin

- *Malaclemys terrapin*
- Nest in similar habitats of the horseshoe crab

Loggerhead Sea Turtle

- *Caretta caretta*
- Listed as Threatened under ESA

Leatherback Sea Turtle

- *Dermochelys coriacea*
- Listed as Endangered under ESA
- Dead leatherback stranded in Chester River just south of refuge in 1992

Manatee

- One captured at Queenstown in 1994
- Listed as Endangered under ESA

Humpback Whale

- *Megaptera novaengliae*
- Listed as Endangered under ESA
- Nearest sighting at Bay Bridge (MD) in 1992

Appendix B

Mark Wilson/USFWS

American black duck

Findings of Appropriateness and Compatibility Determinations

COMPATIBILITY DETERMINATION

USE: Wildlife Observation, Wildlife Photography, Interpretation, and Environmental Education

STATION NAME: Eastern Neck National Wildlife Refuge (Chesapeake Marshlands NWR Complex)

ESTABLISHING AND ACQUISITION AUTHORITIES:

The Chesapeake Marshlands National Wildlife Refuge Complex (CMNWRC) is composed of four nationally significant wildlife areas: Eastern Neck NWR, Blackwater NWR, Martin NWR, and Susquehanna NWR with several separate divisions.

Eastern Neck NWR was established by executive order on December 27, 1962, under the Migratory Bird Conservation Act (MBCA) (16 U.S.C. 715 d) "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." Additional tracts were acquired through 1966 under the MBCA authority to bring the refuge to its approved acquisition boundary containing 2,286 acres. By virtue of its strategic location at the confluence of the Chester River and the Chesapeake Bay, it is of significant value to migrating and wintering waterfowl on Maryland's Upper Eastern Shore.

REFUGE PURPOSE(S):

All tracts were acquired under the authority of the Migratory Bird Conservation Act (16 U.S.C. § 715 d), the purpose of the acquisition is "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

"To administer a national network of land and waters for the conservation, management, and where appropriate, the 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 Improvement Act of 1997, Public Law 105-57)."

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority use?
The use is wildlife observation, wildlife photography, interpretation, and environmental education. These uses include special events such as the owl prowls, waterfowl watch, and the big sit. Expansion of these programs may include holding special events in support of International Migratory Bird Day, National Wildlife Refuge Week, or Earth Day. The National Wildlife Refuge System Improvement Act of 1997 identified wildlife observation, wildlife photography, interpretation, and environmental education as four of the six, priority, wildlife-dependent recreational uses to be facilitated in the Refuge System. The Act encouraged the Service to provide opportunities for these uses when found compatible with the purposes for which the refuge was established.

(b) Where would the use be conducted?
Wildlife observation, wildlife photography, and interpretation would be conducted on the Tundra Swan Boardwalk, Visitor Contact Station at Refuge Headquarters with access to Tidal Marsh Trail and observation blind, Bayview Butterfly observation platform, Bayview Trail with observation blind, Bayscape Garden and Trail, Wildlife Trail with observation blind, Duck Inn Trail, Boxes Point Trail, Ingleside Recreation Area, Bogles Wharf, and Wickes historic site. Opportunities for wildlife observation and wildlife photography also exist along county roads passing through the refuge, as well as gravel access roads throughout the refuge and around the refuge via the watertrail. Environmental Education would be conducted primarily at Ingleside Recreation Area, shoreline restoration sites, and Tubby Cove Boardwalk and platform. Special events may be held at a variety of locations on the refuge.

(c) When would the use be conducted?
These uses would be conducted daily, year-round from sunrise to sunset. Ingleside Recreation Area would be open from sunrise to sunset from April 1 through September 30. Special Events would have specific dates and times. These uses would be specifically regulated or closed during times of refuge management activities where safety is a concern. Occassionally permits would be issued to allow use after normal hours and other special uses.

(d) How would the use be conducted?
Wildlife observation, wildlife photography, and interpretation would be conducted through self-guided or partner-guided means. Access to trails is limited to foot traffic. Vehicle and bicycle traffic is restricted to designated roads. Any access to closed areas for these activities would require a permit from the refuge manager. Environmental education for teachers and/or students would be self-guided or partner-guided activities. Staff involvement would be limited to a general orientation about the refuge, the National Wildlife Refuge System and U.S. Fish and Wildlife System. Volunteers would also assist in conducting these uses. Visitor Contact Station conference room would be available for meetings and classroom needs.

(e) Why is the use being proposed?
These uses would be conducted to provide compatible educational and wildlife-dependent recreational opportunities for visitors to enjoy the resource and to gain understanding and appreciation for natural resource conservation, Eastern Neck NWR, and the National Wildlife Refuge fish and wildlife.

The Kent County School District has curriculum requirements that include field trips to the refuge for every fourth-grade student. The use of environmental education would allow the school district to continue to provide a natural setting for their curriculum needs. U.S. Fish and Wildlife policy gives guidelines for environmental education that range from connecting people's lives to the natural world, to strengthening conservation literacy and knowledge, to stressing the role of the Refuge System in conservation , and finally to instilling a sense of stewardship and understanding of our conservation history.

These uses would not only allow us to follow the guidelines, but also would give partners and volunteers opportunities to enjoy the refuge while assisting others. The authorization of these

uses would produce a more informed public, and advocates for Service programs. Likewise, these uses would provide opportunities for visitors to observe and learn about wildlife and wildlands at their own pace in an unstructured environment and to observe wildlife habitats firsthand.

Photographers will also be provided opportunities to photograph wildlife in their natural habitats. These uses would also provide wholesome, safe, outdoor recreation in a scenic setting, with the realization that those who come strictly for recreational enjoyment will be enticed to participate in the more educational facets of the public use program, and can then become advocates for the refuge, the Refuge System, and the Service.

AVAILABILITY OF RESOURCES:

The National Aquarium in Baltimore provides staff and grant funding for annual school group visits. They are assisted by the Friends of Eastern Neck and other refuge volunteers. Maryland Department of Natural Resources and Kent County coordinate with Kent County schools to bring fourth graders to the refuge each year for environmental education programs.
Other resources include: a Visitor Contact Station, conference room, outside restrooms at Visitor Contact Station and Tubby Cove, Cape Chester House (for volunteer and partner housing), trails and other facilities, kiosks, signs, and brochures. A portion of the funds needed to maintain the four priority uses is in the form of salaries to maintain the trails, to provide protection and monitoring, maintenance materials, updating of interpretation and outreach information, and on-going interaction between partners and refuge staff. A Visitor Services Specialist, a Maintenance Worker GS-8, and a new Wildlife Refuge Specialist, would adminsiter, maintain, and monitor the program. Law Enforcement would be provided by the Chesapeake Marshlands NWR Complex Law Enforcement Officer. Routine and emergency maintenance of County roads (Eastern Neck and Bogle's Wharf Roads) would be provided by Kent County personnel.

COST BREAKDOWN:

The following is a breakdown of annual operating costs for the program:

Service Staffing Costs

Visitor Services Specialist GS-0025-7	$14,175
Maintenance staff	$25,000
Wildlife Refuge Specialist	$16,575
Law Enforcement with support cost	$920
Total	$56,670

Facility and Equipment Costs

2 Kiosks with interpretive panels and bulletin cases	$15,000
Resurface and re-curb Bayview Butterfly Trail	$10,000
Informational signs	$1,500
Brochures — fishing, trials, butterfly, historical & cultural resources	$8,000
General refuge brochure	$4,000
Total	$38,500

ANTICIPATED IMPACTS ON REFUGE PURPOSE(S):

The following is a summary of the environmental, socioeconomic, and cultural/historical impacts of these programs as more thoroughly described in the Environmental Assessment prepared for the Eastern Neck NWR Comprehensive Conservation Plan of which this document is an attachment.

Wildlife observation, photography, interpretation, and environmental education can affect the wildlife resource positively or negatively. A positive effect of public involvement in these priority public uses will be a better appreciation and more complete understanding of the refuge wildlife and habitats. That can translate into more widespread, stronger support for Eastern Neck Refuge, the Refuge System and the Service. Pedestrian travel (walking and biking) has the potential of impacting waterfowl, marshbirds and other migratory bird populations feeding and resting near the trails and on beaches during certain times of the year. Use of upland trails is more likely to impact songbirds than other migratory birds.

Short-term impacts: Short-term impacts have an immediate effect on wildlife. The refuge priority uses being evaluated may impose minor negative impacts on specific station physical resources such as trails and roads, and on natural resources such as vegetation and wildlife. Impacts may include erosion, deterioration, trampling, and temporary disturbance. Wildlife disturbances typically results in a temporary displacement without long-term effects on individuals or populations. Some species will avoid the areas people frequent, such as the developed trails and the buildings, while others seem unaffected by or even drawn to the presence of humans. Increased visitation and increased opportunities for consumptive and non-consumptive uses would also increase the likelihood of damage or disturbance of cultural and historic resources on the refuge. However, those effects should not be significant, since almost all public uses described herein occur in specific footprints on the refuge, such as refuge trails.

Long-term impacts: Long term impacts are anticipated to be minimal since only certain areas are open to the public, and sensetive areas, such as bald eagle nesting sites, will be closed as needed. An indirect long term impact is the potential for visitors to unintentionally introduce and/or spread invasive species. Once established, invasive plants can out-compete native plants, thereby altering habitats and impacting wildlife. The threat of invasive plant establishment will always be an issue, and will require annual monitoring, treatment and public education.

Cumulative impacts: Impacts may be minor when we consider them alone, but may become important when we consider them collectively. Our principal concern is repeated disruptions of nesting, resting, or foraging birds.

Our knowledge and observations of the affected areas show no evidence that these four, priority, wildlife dependent uses cumulatively will adversely affect the wildlife resource. We also have not observed significant resource degradation, long-term consequences, or cumulative effects on any of the refuges with established programs. However, opening refuge lands to public use can often result in littering, vandalism, or other illegal activities on the refuges. Although we do not expect substantial cumulative impact from these four priority uses in the near term, it will be important for refuge staff to monitor those uses and, if necessary, respond to conserve high-quality wildlife resources.

Refuge staff, in collaboration with volunteers, will monitor and evaluate the effects of these priorities public uses to discern and respond to any unacceptable impacts on wildlife or habitats. To mitigate those impacts, the refuge will close areas where such birds as eagles are nesting.

PUBLIC REVIEW AND COMMENT:

We released this compatibility determination for 52 days of public review and comment from September 9 to October 30, 2009 as part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Eastern Neck NWR. We also officially announced the availability of the draft plan for public comment in the *Federal Register* on September 9, 2009, as well as in media news releases and in a newsletter we distributed to approximately 1,000 individuals, state, federal and county agencies, organizations, and corporations on our CCP project mailing list. This level of public review fully complies with Service policy and NEPA. No change in this compatibility determination was warranted based on comments received.

DETERMINATION: (CHECK ONE)

___ Use is Not Compatible

_X_ Use is Compatible With the Following Stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

- We will permit these four priority uses at Ingleside Recreation Area only from April 1 through September 30
- We will install signs for visitor information, safety, and resource protection.
- We will conduct an outreach program to promote public awareness and compliance with public use regulations.
- Off-trail use or use during a refuge's closed hours requires a special use permit unless the activity is in conjunction with a Refuge staff- or volunteer-led program.
- Certain areas on refuges may be closed to public access at any time at the Refuge Manager's discretion to protect sensitive habitats, species of concern, minimize conflicts with other refuge activities, or due to human health and safety concerns
- We will conduct baseline inventories of the physical condition of the shoreline, beaches and trail systems biannually to monitor how pedestrian use affects plant life. Use any changes in physical conditions to identify any management interventions required to protect refuge resources.

- We will conduct biological inventories to provide baseline information for measuring change. If monitoring and evaluation of the use indicate that compatibility criteria are being exceeded, take appropriate action to restore compatibility, including modifying or discontinuing the use.

- We will conduct routine law enforcement patrols throughout the year. The patrols will promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interaction. The patrols will record visitor numbers, visitor activities, and activity locations to document current and future levels of refuge use.

JUSTIFICATION:

The National Wildlife Refuge System Improvement Act of 1997 (Pub. L. 105–57) identifies six legitimate and appropriate uses of wildlife refuges: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Where these uses have been determined compatible, they are to receive enhanced consideration over other uses in planning and management.

We have determined four of the six priority wildlife dependent uses to be compatible at their current levels and under the stipulations listed above. Under those conditions, we do not expect them to materially interfere with or detract from the mission of the Refuge System or diminish the purposes for which Eastern Neck NWR was established.

Signature: Refuge Manager _____ 3/5/2010
(Signature and Date)

Concurrence: Regional Chief _____ 3-19-10
(Signature and Date)
Anthony D Leger 3-24-2010

Mandatory 15-year Re-evaluation Date: March 24, 2025

COMPATIBILITY DETERMINATION

USE: Big Game Hunting

STATION NAME: Eastern Neck National Wildlife Refuge (Chesapeake Marshlands NWR Complex)

ESTABLISHING AND ACQUISITION AUTHORITIES:

The Chesapeake Marshlands National Wildlife Refuge Complex (CMNWRC) is composed of four nationally significant wildlife areas: Eastern Neck NWR, Blackwater NWR, Martin NWR, and Susquehanna NWR with several separate divisions.

Eastern Neck NWR was established by executive order on December 27, 1962, under the Migratory Bird Conservation Act (MBCA) (16 U.S.C. 715 d) "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." Additional tracts were acquired through 1966 under the MBCA authority to bring the refuge to its approved acquisition boundary containing 2,286 acres. By virtue of its strategic location at the confluence of the Chester River and the Chesapeake Bay, it is of significant value to migrating and wintering waterfowl on Maryland's Upper Eastern Shore.

REFUGE PURPOSE(S):

All tracts were acquired under the authority of the Migratory Bird Conservation Act (16 U.S.C. § 715 d), the purpose of the acquisition is "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

"To administer a national network of land and waters for the conservation, management, and where appropriate, the 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 Improvement Act of 1997, Public Law 105-57)."

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority use?
The use is big game hunting for white-tailed deer and wild turkey. The National Wildlife Refuge System Administration Act of 1997 (Public Law 105-57), identified hunting as one of the six, priority, wildlife-dependent recreational uses to be facilitated in the refuge System, and the act encouraged the Service to provide opportunities for these uses when compatible with the purposes for which the refuge was established .

Deer hunting was a traditional use on Eastern Neck long before it became part of the National Wildlife Refuge System. When the refuge was established all hunting was halted. It soon became apparent that the ever increasing deer herd was having significant impacts on both upland plant

communities and the amount of food crops available for waterfowl. We implemented a deer hunting program to provide public hunting opportunities and assist with the crop depredation program. A limited spring turkey hunt was later coordinated with the National Wild Turkey Federation to provide additional hunting opportunities for youths.

(b) Where would the use be conducted?
Approximately, 1,900 acres of the refuge's 2,286 acres are used for deer hunting. Most deer hunting takes place in forested uplands and forested wetlands adjacent to farm fields. Some deer hunting occurs in the marshes surrounding the uplands.

Turkey hunting is conducted in four designated units on the refuge. The area open for turkey hunting is similar to that open for deer hunting. Each year an evaluation will be conducted prior the hunt to determine if portions of each hunt may be closed to protect sensitive natural resources

See attached Public Hunting Maps

(c) When would the use be conducted?
White-tailed deer hunting takes place in the fall between September and December. Currently, we provide one day of archery hunting, two days for muzzleloading hunting, two days for shotgun hunting, a youth hunt and a disabled hunt. Designated scouting days will also be identified. Hunting would be permitted one-half hour before sunrise to one-half hour after sunset.

Turkey hunting takes place in the spring during April and May. Hunting would be permitted one-half-hour before sunrise until 12:00 PM. A minimum of two half day hunts will be conducted during the spring season.

(d) How would the use be conducted?
During the deer and turkey hunts, hunters walk-in to the hunting areas from designated parking areas. Off-road vehicle use is prohibited except by disabled hunters with a permit.
We will provide deer hunting opportunities for approximately 600 hunters annually. Hunters will be chosen through a mail-in process and selected in order of their receipt by mail. Deer hunting would take place approximately seven days each fall season. Opportunities will be provided for disabled, youth, archers, muzzleloader, and shotgun hunters. Hunting opportunities will be provided to a minimum of six youth turkey hunters annually. Turkey hunting opportunities would be provided for youth hunters ages 10 through 15. Many of the logistics would be similar to the deer hunts. In order to maintain a quality hunt, turkey hunting opportunities will be provided on a much more limited basis. A check station will be operated by volunteers and staff. All deer and turkey harvested must be checked out through the check station. Administrative fees would be charged for applying for each deer hunt. Fees are used to hire a hunt program coordinator and to offset other hunt related expenses.

The refuge would evaluate the hunt program on an annual basis and make adjustments as needed. The program objectives would be to ensure a compatible, quality, safe, wildlife-dependent recreational hunting experience.

(e) Why is the use being proposed?
Providing hunting opportunities is one of the USFWS six priority wildlife-dependent public uses. Controlling deer numbers reduces depredation of crops provided for wintering waterfowl. Providing a youth turkey hunt give an opportunity to young hunters to learn more about our natural resources, Eastern Neck NWR, the National Wildlife Refuge System and the U.S. Fish and Wildlife Service. These hunts are designed to provide a quality, compatible, wildlife oriented experience.

AVAILABILITY OF RESOURCES:

The majority of work related to running the deer hunt program is paid for by the Friends of Eastern Neck Refuge (FOEN). A hunt coordinator is hired by the FOEN. The Hunt Coordinator administers most aspects of the deer hunt program, responds to all questions and provide information to the public, process hunt applications and permits, conduct mailings; provides visitor assistance for the hunt programs, improves customer service, and makes a positive impression to customers and the public and otherwise assists hunters in following regulations and enjoying a good hunting experience. FOEN will continue to fund the annual publication of regulations, permit applications, maps, and leaflets. Any remaining revenue generated from the administrative process and permit application fees would be used to replace signs, provide materials to help maintain parking areas and roads.

The infrastructure (parking lots, signs, gates and hunter check station (trailer) and some equipment are already available at Eastern Neck NWR. Other needed equipment would be supplemented through the Chesapeake Marshlands NWR Complex hunt program. We will not need to procure, construct, or create any new facilities or infrastructure at this time. Refuge staff provides management assistance for maintain existing infrastructure, posting and assisting with check station operation. There should be only minimal administration and management costs for the government associated with management of the deer hunt.

The youth turkey hunt is administered by refuge staff in partnership with the Wild Turkey Federation. The administrative costs for this limited hunt are minimal and can be handled within current staffing and budget allocations.

COST BREAKDOWN:

The following is the list of annual costs the Refuge requires to administer and manage the big game hunt program.

Refuge Costs:
Posting/gate closing (9 days @ 2 hrs/day @ $25/hr) $450
Assisting with check station (9 days @ 3 hrs/day @ $25/hr) $675
Law enforcement (9 days @ 3 hrs/day @ $25/hr) $675
Fuel, travel, meals and lodging (9 days @ $150/day). $1,350

Total cost to refuge. $3,150

ANTICIPATED IMPACTS ON REFUGE PURPOSE(S):

The following is a summary of the environmental, socioeconomic, and cultural/historical impacts of the hunt programs. Impacts from these hunts are expected to be minimal on refuge resources other than other species of wildlife that are being hunted. Close monitoring of the impacts of these hunts have occurred over the last several years and have not been substantial.

Short-term impacts: Hunting activities may impose minor negative impacts on specific station physical resources such as trails and roads, and on natural resources such as vegetation and wildlife. Impacts may include erosion, deterioration, trampling, and temporary disturbance. Vehicles will be restricted to roads and parking areas, to minimize impacts to sensitive habitats. Wildlife disturbances typically results in a temporary displacement without long-term effects on individuals or populations. Impacts on waterfowl using the refuge will be minimal due to the timing of the hunts, and sensitive areas, such as bald eagle nesting sites, will be closed to access, if necessary.

Impacts on other public uses will be minimal. The refuge will be closed to non-permitted visitors during the twelve hunting days of the year. Allowing refuge hunts will stimulate the local economy by bringing in money from out of town hunters that will be staying in motels, eating in restaurants, buying gasoline and shopping locally.

Hunting could have some impact on cultural/historical resources. Eastern Neck has a rich cultural resource history and was used by Native Americans. The potential loss or damage of important sites increases by the presence of hunters in areas normally closed to the general public. This could lead to the potential disturbances and inadvertent discoveries and/or exposures of cultural resources.

Long-term impacts: Habitats subject to deer damage include refuge cropland, forest understory and shrub habitat that migratory and wintering waterfowl and migratory songbirds depend on for food resources. Controlled deer hunting helps keep the deer population within the carrying capacity of the habitat. Reduction in the deer herd reduces crop depredation leaving more crop resources for migratory and wintering waterfowl. Providing quality habitat and food resources for waterfowl are a high priority for the refuge. Additionally, heavily browsed vegetation leaves less food and cover habitat for neotropical migratory birds, another trust resource which the refuge is charged with protecting. Managing a public deer hunting program will help reduce the browse effects on vegetation. This will enable the forest understory to grow and produce more food and cover for neotropical migrants. It will also provide additional habitat for small mammals and invertebrates.

An indirect long term impact is the potential for hunters to unintentionally introduce and/or spread invasive species. Once established, invasive plants can out-compete native plants, thereby altering habitats and impacting wildlife. The threat of invasive plant establishment will always be an issue, and will require annual monitoring, treatment and hunter education.

Cumulative impacts: Impacts may be minor when we consider them alone, but may become important when we consider them collectively. Our principle concern is impacts to the refuge and

state deer populations. Five of the refuge hunts occur before the corresponding State season, and deer move between the mainland and the refuge depending on hunting pressures. This allows the deer herd to more readily recover from the refuge and State season hunts. The deer herd on the mainland is monitored by the state. It will be important that the State continue annual monitoring and evaluate the effects of the refuge seasonal hunt on the mainland's deer population. Refuge staff will collaborate with the State, and apply adaptive management as needed.

Overall, cumulative impacts are expected to be minimal.

PUBLIC REVIEW AND COMMENT:

We released this compatibility determination for 52 days of public review and comment from September 9 to October 30, 2009 as part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Eastern Neck NWR. We also officially announced the availability of the draft plan for public comment in the *Federal Register* on September 9, 2009, as well as in media news releases and in a newsletter we distributed to approximately 1,000 individuals, state, federal and county agencies, organizations, and corporations on our CCP project mailing list. This level of public review fully complies with Service policy and NEPA. No change in this compatibility determination was warranted based on comments received.

DETERMINATION: (CHECK ONE)

___ Use is Not Compatible

_X_ Use is Compatible With the Following Stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Hunt program stipulations have been developed through many years of running hunt programs on refuges.

- Special regulations governing hunt programs will be codified in the Code of Federal Regulations, Title 50.
- Specific regulations will be highlighted in refuge hunt applications and brochures. Hunters are required to sign their permit acknowledging they have read all refuge regulations and agree to abide by them.
- Refuge managers and law enforcement personnel will be needed to continuously monitor hunt programs to ensure hunters are complying with regulations and that the hunt program is compatible with the purposes for which the refuge was established.
- All hunters must possess a valid Maryland State hunting license, any required stamps, a signed refuge hunt permit and photo identification. Refuge hunt permits are not transferable.

- No more than 100 permits will be issued for any one deer hunt. All initial hunt permits must be obtained through the mail. Standby hunters will be issued permits for available spaces on the day of the hunt.

- Youth hunters must be at least 10 years old but less than 16 years old. They must be accompanied by a licensed or exempt from licensed, unarmed adult, 21 or older. An adult must remain with the youth at all times.

- Only hunters possessing authorized permits will be allowed to enter areas opening to hunting.

- All hunters are required to check in and out at the Hunter Check Station.

- All deer and turkey killed must be properly tagged in the field and presented for examination at the Hunter Check Station.

- Hunters are required to seek refuge employee assistance to retrieve deer or turkeys from closed areas.

- Persons possessing, transporting, or carrying firearms on National Wildlife Refuges must comply with all provisions of state and local law. Persons may only use (discharge) firearms in accordance with refuge regulations (50 CFR 27.42 and specific refuge regulations in 50 CFR Part 32).

- Scouting is allowed on designated days listed in the regulations for permitted hunters only. Check in and out is not required on scout days.

- Permitted youth hunters must be accompanied by permitted adult age 19 or older when scouting.

- A minimum of 400 square inches of solid-colored fluorescent orange clothing is required on the head, chest, back of all deer hunters during the youth, muzzleloader and shotgun hunts. All participants must also wear a solid florescent orange hat or cap when walking to or from their hunting positions.

- Pets or other domestic animals are not allowed in hunt areas.

- Commercialized guiding of refuge hunts is prohibited.

JUSTIFICATION:

The National Wildlife Refuge System Administration Act of 1997 (Public Law 105-57), identified hunting as one of the six, priority, wildlife-dependent recreational uses to be facilitated in the refuge System, and the act encouraged the Service to provide opportunities for these uses.

It has been determined in the preceding sections that deer and spring turkey hunting programs are compatible. Palmer et al. (1980) and Cypher (1988) state that the only biologically sound and cost effective method to keep a deer population in balance with its environment is through regulated hunting. Over-browsing by an unmanaged deer population has a detrimental effect on understory vegetation and on regeneration of hardwoods (Butt 1984). Likewise, an unmanaged deer population causes severe crop depredation on refuge property and on the property of adjacent land owners. This crop depredation results in negative socioeconomic impact on the private landowners as well as competition with migratory waterfowl and the endangered Delmarva fox squirrel. Croplands can account for 41% of the annual diet in deer even though other prime food sources are available (Dusek et al. 1989).

A regulated deer hunt is essential to accomplish the goal of managing a healthy deer population, resulting in high productivity and recruitment for both consumptive and non-consumptive wildlife-orientated recreation. Dickerson (1983) noted the drastic effect of the "no hunting" approach to deer management. He examined harvested deer from a state park in New York where hunting had been prohibited for 71 years. Through these observations, he concluded that due to the lack of hunting, the deer herd was in the worst physical condition of any he had observed in New York and possibly the northeast.

Limited spring turkey hunting in accordance with the restrictions and numbers of hunters proposed would have insignificant impacts on biological resources, with the exception that obviously a few gobblers would be killed. However, their removal from the population would not have significant impacts on the species or its abundance.

These proposed hunts on Easter Neck NWR will not materially interfere with or detract from the purpose for which the refuge was established.

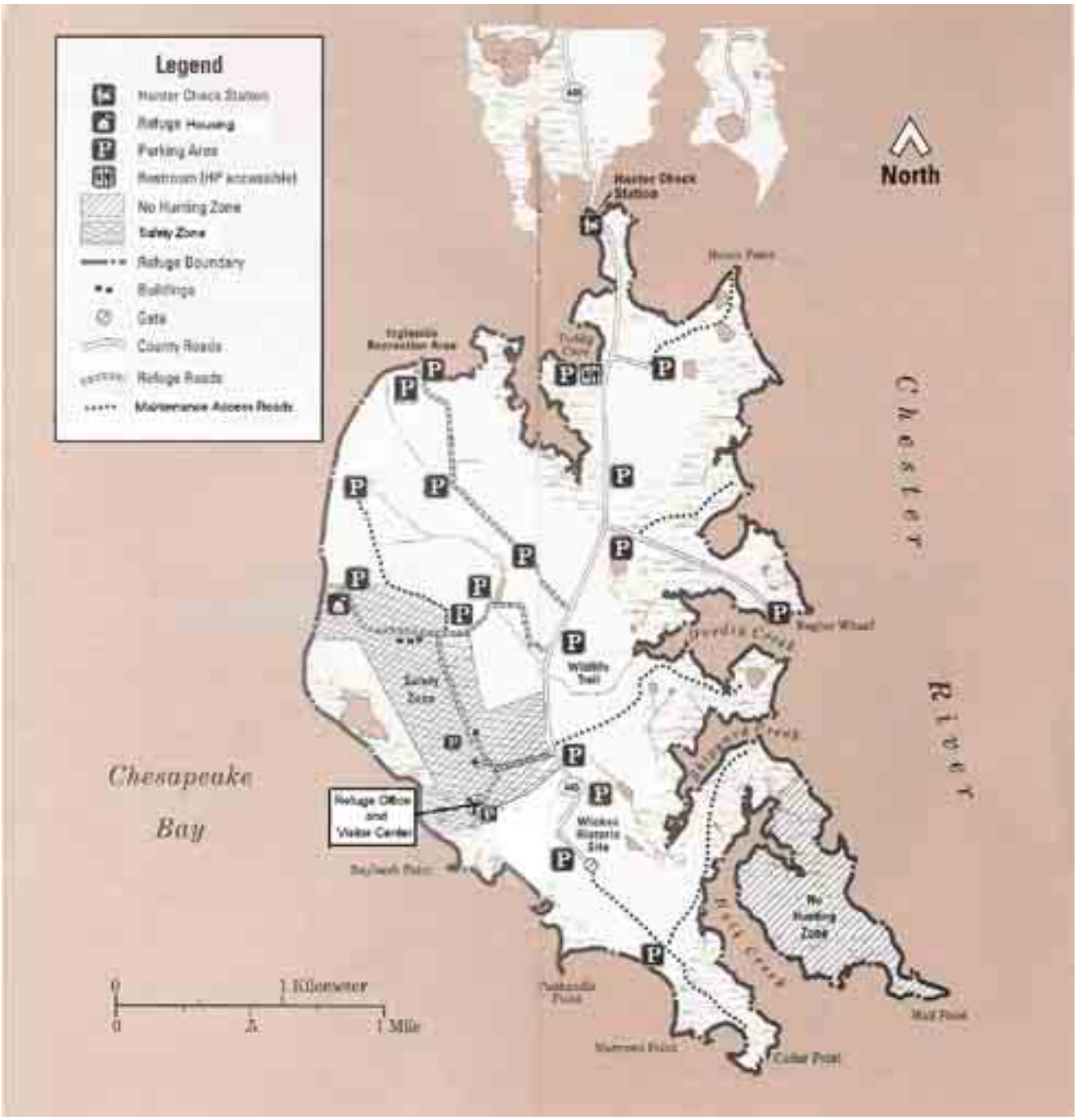
Signature: Refuge Manager _____ 3/5/2010
(Signature and Date)

Concurrence: Regional Chief _____ 3-19-10
(Signature and Date)
Anthony D Leger 3-24-10

Mandatory 10-year Re-evaluation Date: March 24, 2025

ATTACHMENTS: Public Hunting Maps

Map B.1 Eastern Neck Refuge deer hunt program map



Map B.2 Eastern Neck Refuge youth turkey hunt program map

REFERENCES:

Butt, J.P. 1984. Deer and trees on the Allegheny: how could hunters keep the deer and the forest service keep regeneration when the deer were eating the regeneration? Journal of Forestry 82(1984):468-471.

Cypher, B.L., E.A. Cypher. 1988. Ecology and management of white-tailed deer in northeastern coastal habitats: a synthesis of the literature pertinent to the National Wildlife Refuges from Maine to Virginia. U.S. Fish and Wildlife Service, Biological Report 88(15). 52pp.

Dickinson, N.R. 1983. An example of the effect of underharvesting on a deer population. N.Y. Fish and Game Journal 30(1983):231-232.

Dusek, G.L., R.J. Mackie, J.D. Herriges, Jr., B.B. Compton. 1989. Population ecology of white-tailed deer along the lower Yellowstone River. Wildlife Monographs 104:1-68.

Palmer, D.T., D.A. Andrews, R.O. Winters, and J.W. Francis. 1980. Removal techniques to control an enclosed deer herd. Wildlife Society Bulletin 8(1):29-33.

COMPATIBILITY DETERMINATION

USE: Recreational Fishing and Crabbing

STATION NAME: Eastern Neck National Wildlife Refuge (Chesapeake Marshlands NWR Complex)

ESTABLISHING AND ACQUISITION AUTHORITIES:

The Chesapeake Marshlands National Wildlife Refuge Complex (CMNWRC) is composed of four nationally significant wildlife areas: Eastern Neck NWR, Blackwater NWR, Martin NWR, and Susquehanna NWR with several separate divisions.

Eastern Neck NWR was established by executive order on December 27, 1962, under the Migratory Bird Conservation Act (MBCA) (16 U.S.C. 715 d) "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." Additional tracts were acquired through 1966 under the MBCA authority to bring the refuge to its approved acquisition boundary containing 2,286 acres. By virtue of its strategic location at the confluence of the Chester River and the Chesapeake Bay, it is of significant value to migrating and wintering waterfowl on Maryland's Upper Eastern Shore.

REFUGE PURPOSE(S):

All tracts were acquired under the authority of the Migratory Bird Conservation Act (16 U.S.C. § 715 d), the purpose of the acquisition is "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

"To administer a national network of land and waters for the conservation, management, and where appropriate, the 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 Improvement Act of 1997, Public Law 105-57)."

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority use?
The use is recreational fishing and crabbing, including access to fishing and crabbing opportunities. This is an existing use. The National Wildlife Refuge System Improvement Act of 1997 identified fishing as one of the six, priority, wildlife-dependent recreational uses to be facilitated in the Refuge System, and the act encouraged the Service to provide opportunities for these uses.

(b) Where would the use be conducted?
Access for fishing and crabbing would be at the Entrance Bridge, Tundra Swan Boardwalk, Duck Inn Trailhead at Chester River, Boxes Point Trailhead at Chester River, Ingleside Recreation Area and Bogle's Wharf. Special Event fresh water fishing would be at the Headquarter's Pond only during time of Youth Fishing Derby.

(c) When would the use be conducted?
Fishing and crabbing at the Entrance Bridge, Tundra Swan Boardwalk, Duck Inn Trailhead at Chester River, Boxes Point Trailhead at Chester River and Bogle's Wharf will be conducted year-round. Entrance Bridge and Bogle's Wharf would be open during hours set by Maryland DNR Fishing at Tundra Swan Boardwalk, Boxes Point Trail and Duck Inn Trail would be from sunrise to sunset year round. Fishing and crabbing at Ingleside Recreation Area would be conducted from April 1 through September 30 from sunrise to sunset. Special Event fresh water fishing at the Headquarter's Pond would be conducted only during time of the Youth Fishing Derby which is usually held in June.

(d) How would the use be conducted?
Fishing and crabbing would be conducted with no staff involvement except during the Youth Fishing Derby. During the Youth Fishing Derby, staff and volunteers would monitor the participants and provide a variety of partner-led activities. Maryland Department of Natural Resources would stock the Headquarter's Pond prior to the Derby. The Friends of Eastern Neck would provide refreshments and prizes for participants. Other staff involvement would come from general maintenance of the fishing access sites and routine law enforcement patrols.

(e) Why is the use being proposed?
The Service does not have jurisdiction over the shallow and deep waters surrounding the island and therefore we do not regulate fishing or other water-based activities within the navigable waters of the State, or within areas where water bottoms are State-owned. However, we do provide access to these activities from refuge lands, and conduct enforcement of rules and regulations at five fishing/crabbing areas.

Fishing and crabbing have been historical, consumptive recreational uses on the refuge that we believe are compatible with our resource objectives. Approximately 500 anglers use the refuge to access fishing areas each year; however, this number tends to fluctuate with the quality and availability of crabbing.

We will strive to meet these guiding principles for a refuge recreational fishing program identified in Service policy (605 FW3 and 4):

1. Effectively maintain healthy and diverse fish communities and aquatic ecosystems through the use of scientific management techniques;

2. Promote visitor understanding of, and increase visitor appreciation for, America's natural resources;

3. Provide opportunities for quality recreational and educational experiences consistent with criteria describing quality as defined in 605 FW 1.6;

4. Encourage participation in this tradition deeply rooted in America's natural heritage and conservation history; and,

5. Minimize conflicts with visitors participating in other compatible wildlife-dependent activities.

AVAILABILITY OF RESOURCES:

Resources involved in the administration and management of the use: Volunteers to monitor the monofilament recovery and recycling containers, maintenance staff to maintain fishing access sites and to maintain water level in Headquarters' Pond for Youth Fishing Derby, visitor services staff and wildlife refuge specialist to provide assistance and oversight at Youth Fishing Derby, Complex law enforcement staff to provide routine patrols and Maryland Department of Natural Resources to stock Headquarters' Pond for Youth Fishing Derby.

Special equipment, facilities, or improvements necessary to support the use:

Monofilament recovery and recyling containers at each fishing access site: One donated and two will be constructed with funds donated by Friends group

COST BREAKDOWN:

The following is the list of annual cost for the Refuge requires to administer and manage the program.

Preparation of signs, maps, trails, info (30 hrs @ $30/hr) $900
Fishing Event (12 hrs @ $30/hr) $360
Maintenance of fishing facilities (60 hrs@$30/hr) $1,800
Law Enforcement (30 hrs @ $24/hr) $720
Support cost (fuel, travel expenses) $300

Total $4,080

Non-Refuge Costs Provided by Partnerships, Grants, and Donations
Monofilament recovery and recycling containers $100

ANTICIPATED IMPACTS OF THE USE:

Short-term impacts: Anticipated impacts of fishing and crabbing are expected to be minimal. Although fishing and crabbing causes mortality to fish and crabs, season dates and limits are set with the long-term health of populations in mind. Populations of most species are regularly monitored by state agencies which have determined that a controlled recreational fishing harvest would not adversely affect overall fish population levels.

Recreational fishing opportunities may cause temporary disturbances such as the flushing of feeding, resting, or nesting birds, especially waterfowl, and other wildlife species. This disturbance may displace individual animals to other parts of the refuge; however, this disturbance would be limited in scope due to the limited number of areas accessible to anglers. Most visitors understand the protection afforded by the Refuge, and the Service will continue to provide educational materials and adequate signage, these instances should remain rare. Access for fishing is limited to the use of maintained roads and parking areas.

Visitors who are fishing and crabbing may introduce litter and lead sinkers that may harm shorebirds. No lead sinkers will be permitted during the Youth Fishing Derby to prevent lead

poisoning to wading birds that use the Headquarters' Pond. Discarded fishing line and other fishing litter can entangle migratory birds and mammals and cause injury and death. This will be reduced through the use of monofilament recovery and recycling containers at fishing acces sites. Fisherman and crabbers, like other visitors, have the potential to damage vegetation and increase erosion.

Long-term impacts: There are no anticipated long-term impacts of this use as long as fish and crab populations continue to be monitored by the state. Increased fishing and crabbing would cause some displacement of habitat and increase some disturbance to wildlife, although this is expected to be minor given the avoidance or minimal intrusion into important wildlife habitat especially when wintering waterfowl are present.

Cumulative impacts: Overall Refuge visitation may increase due to local tourism. Therefore, all uses on the Refuge may increase over time. However, fishing and crabbing is limited to specific areas so that it would have little cumulative impact with other uses. Fishing and crabbing will be monitored to see if the amount of use occurring on the Refuge is becoming too great. Therefore, there are no anticipated cumulative impacts.

PUBLIC REVIEW AND COMMENT:

We released this compatibility determination for 52 days of public review and comment from September 9 to October 30, 2009 as part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Eastern Neck NWR. We also officially announced the availability of the draft plan for public comment in the *Federal Register* on September 9, 2009, as well as in media news releases and in a newsletter we distributed to approximately 1,000 individuals, state, federal and county agencies, organizations, and corporations on our CCP project mailing list. This level of public review fully complies with Service policy and NEPA. No change in this compatibility determination was warranted based on comments received.

DETERMINATION (CHECK ONE):

___ Use is Not Compatible

_X_ Use is Compatible With the Following Stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

- We require a valid Maryland sport fishing license. We do not require a refuge permit.
- Anglers must comply with all refuge regulations concerning restrictions on the time of day or time of year for fishing.
- Access for fishing and crabbing would be at the Entrance Bridge, Tundra Swan Boardwalk, Duck Inn Trailhead at Chester River, Boxes Point Trailhead at Chester River, Ingleside Recreation Area and Bogle's Wharf. Special Event fresh water fishing would be at the Headquarter's Pond only during time of Youth Fishing Derby.

- We require all fish and crab lines to be attended.
- Anglers must not clean their catch or dispose of offal on refuge lands or in refuge waters, and must carry all litter off the refuge.

JUSTIFICATION:

Fishing is a priority, wildlife-dependent use of the System, through which the public can develop an appreciation for fish and wildlife (Executive Order No. 12996, March 25, 1996; and the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997). Service policy is to provide opportunities for priority wildlife-dependent uses when they are compatible with the purposes for which the refuge was established and consistent with sound fish and wildlife management. These uses are to receive enhanced consideration during planning and management. Fishing or crabbing, implemented with the above stipulations, will not materially interfere with or detract from the mission of the System or the purposes for which the refuges were established.

Signature: Refuge Manager _____ 3/5/2010
(Signature and Date)

Concurrence: Regional Chief _____ 3-19-10
(Signature and Date)
Anthony D Léger 3-24-10

Mandatory 15-year Re-evaluation Date: March 24, 2025

Appropriate Refuge Use: Cooperative Farming

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Eastern Neck National Wildlife Refuge

Use: Cooperative 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?	✔	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✔	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✔	
(d) Is the use consistent with public safety?	✔	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✔	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✔	
(g) Is the use manageable within available budget and staff?	✔	
(h) Will this be manageable in the future within existing resources?	✔	
(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?	✔	
(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?	✔	

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 ✔ 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** ✔

Refuge Manager: _____ Date: 3/5/2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: 3/10/10

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

FWS Form 3-2319
02/06

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge: Eastern Neck National Wildlife Refuge

Use: Cooperative Farming

JUSTIFICATION:

Eastern Neck NWR was established under the authority of the Migratory Bird Conservation Act "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." Eastern Neck Refuge is the only protected land in the Chester River and Kent County Bayshore Focus Area, which supports some of the most important wintering habitat in the state for American black duck and wintering geese (ACJV 2005 Focus Area Report).

The refuge cooperative farming program is an integral component of the refuge's habitat management efforts. In lieu of paying rent for the use of refuge farm fields, the cooperator supports the accomplishment of refuge habitat management objectives by performing cropland-related services related to our annual habitat management program.

Utilizing croplands will benefit wintering and migratory waterfowl by providing a protected haven and supplemental sources of high energy foods to build fat reserves prior to migration. Therefore, this use is determined to be an appropriate use of Eastern Neck NWR.

COMPATIBILITY DETERMINATION

USE: Cooperative Farming

STATION NAME: Eastern Neck National Wildlife Refuge (Chesapeake Marshlands NWR Complex)

ESTABLISHING AND ACQUISITION AUTHORITIES:

The Chesapeake Marshlands National Wildlife Refuge Complex (CMNWRC) is composed of four nationally significant wildlife areas: Eastern Neck NWR, Blackwater NWR, Martin NWR, and Susquehanna NWR with several separate divisions.

Eastern Neck NWR was established by executive order on December 27, 1962, under the Migratory Bird Conservation Act (MBCA) (16 U.S.C. 715 d) "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." Additional tracts were acquired through 1966 under the MBCA authority to bring the refuge to its approved acquisition boundary containing 2,286 acres. By virtue of its strategic location at the confluence of the Chester River and the Chesapeake Bay, it is of significant value to migrating and wintering waterfowl on Maryland's Upper Eastern Shore.

REFUGE PURPOSE(S):

All tracts were acquired under the authority of the Migratory Bird Conservation Act (16 U.S.C. § 715 d), the purpose of the acquisition is "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

"To administer a national network of land and waters for the conservation, management, and where appropriate, the 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 Improvement Act of 1997, Public Law 105-57)."

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority use?
The use is cooperative farming through a cooperative agreement. Cooperative farming is not a priority public use identified by the National Wildlife Refuge System Administration Act of 1997 (Public Law 105-57), but it is an integral and historical management tool at Eastern Neck NWR.

The Chester River and Kent County Bayshore Focus Area supports some of the most important wintering habitat in the state for American black duck and wintering geese (ACJV 2005 Focus Area Report). Eastern Neck Refuge is the only protected land in the focus area, and within the core wintering area for the Atlantic Population of Canada geese. State Mid-winter Waterfowl Survey data indicate that the Chester River has the largest over-wintering population of

migratory Canada geese of any tributary in the state. The Chesapeake Waterfowl Management Plan, the North American Waterfowl Management Plan, and the Canada Goose Management Plan for Maryland recognize the importance of the refuge in managing for these species.

Due to wetland loss and degradation, natural food resources are inadequate to sustain (and certainly to increase) the current levels of waterfowl use on Eastern Neck Refuge. Furthermore, very few "hot foods" (e.g., corn and sorghum, which are high in carbohydrates and energy) are available off refuge; those that are, are consumed early in the winter season. When birds have to travel long distances to seek food off the refuge in severe winter weather, their energy reserves are quickly depleted. Consequently, the refuge plants row crops and cool-season grasses or forbs each year, presently through a cooperative agreement, to sustain wintering migratory waterfowl during critical periods of nutritional and physical stress.

In the CCP, under the preferred alternative, the total acreage allocated to cooperative farming would be reduced from the existing 557 acres to 386 acres. The fields would be configured into fewer, but larger fields which would enhance the security characteristics of the refuge croplands while retaining their productivity of "hot foods." This configuration would be a more efficient and effective operation, and improve the value of the croplands to wintering waterfowl.

Furthermore, the refuge cooperative farming program would be re-evaluated to ensure that the greatest habitat value is provided in the most practical, efficient and effective manner.

(b) Where would the use be conducted?

The refuge cooperative farming program has changed drastically since the refuge was established in the 1960s'. In 1966 when acquisition was completed, lands in the cooperative farming program included 1,020 acres. Over the years this acreage has been reduced by about 50% so that the current program includes approximately 550 acres. This acreage will be reduced to approximately 386 acres by consolidating existing agriculture fields and hedgerows (see attached map).

All cropland fields are bordered by either grass or forested buffer strips that contain or filter runoff. Moist soil units and small retention ponds have been constructed to contain, hold and filter runoff before it drains into the Bay. These impoundments provide excellent habitat for waterfowl, marsh and wading birds and other migratory birds. Additional moist soil units are planned as funding becomes available.

(c) When would the use be conducted?

Cooperative farming activities for corn and soybeans would normally would begin in mid-May and continue until mid-October, annually. Cooperative farming for winter wheat and other cover crops would begin mid-October and continue until mid-June, annually.

(d) How would the use be conducted?

The preferred alternative in the CCP would reduce the current 557 acres of the most productive croplands to 386 acres. This acreage would include fewer, but larger fields, which would enhance the security characteristics of the croplands for waterfowl, while retaining their productivity for "hot foods." This would be accomplished by removing hedgerows, and converting the acres to agriculture production.

The refuge would also re-evaluate the current cooperative farming program to ensure that the most efficient, practical and effective management method is utilized. The evaluation may result in a recommendation that further reduces the acreages included in the cooperative farming program.

Under a cooperative agreement, the refuge would work with a local farmer to plant, cultivate and harvest agricultural crops within refuge croplands. A portion of the crops would be left unharvested for wildlife, while the rest of the crop would be harvested by the local farmer. Refuge staff, equipment and operation dollars would only be used to mow clover fields twice a year and to mow down standing corn for better utilization by migratory waterfowl.

Cropland fields would be bordered by filter strips and buffers, and runoff would be directed into existing sediment basin ponds prior to entering natural wetland systems. Conservation tillage and no-till farming practices would be widely utilized and preferred over conventional methods. This would significantly minimize erosion and siltation.

Crops are managed on a rotation of corn to soybeans to clover. This rotation is desirable for both waterfowl management and good soil conservation management practices. The use of legumes such as soybeans and clover that fix nitrogen reduces the input of chemical fertilizers and liquid nitrogen. The soils in refuge fields are tested annually to determine fertilizer needs. Additionally, after the corn is harvested in the fall, a cover crop of winter wheat is no till planted in the corn stubble. This provides additional high quality browse for migratory waterfowl and other wildlife, reduces soil erosion, and utilizes any excess nutrients that may be in the soil which helps minimize nutrient loading into the watershed.

Crop rotation reduces the need for herbicides and has all but eliminated the need for insecticides. Herbicide use is limited to previously approved compounds that are the least problematic and the least harmful of available products. Pesticides are not permitted except in the rare case of an epidemic whereby the pest exceeds a certain threshold level that could destroy a crop as determined by an Integrated Pest Management agent.

Corn and milo crops are left standing until after the waterfowl hunting seasons. Following closure of the waterfowl hunting season, the crops are made available by mowing or knocking them down. The intended purposes of reserving these crops are: (1) to provide sources of high energy foods to build fat reserves prior to migration; (2) to provide food resources on the refuge to minimize depredation of winter wheat crops on adjacent private lands; and (3) to minimize long distance travel to food during the coldest periods of the year

(e) Why is the use being proposed?

Eastern Neck NWR was established for the management of migratory birds. Before the refuge was established in 1962, Eastern Neck was “the” place to hunt waterfowl on the eastern shore due to the concentrations of waterfowl. The refuge has been designated as a globally significant birding area based on the refuge harboring 1% of the world population of tundra swans during their winter migration and significant populations of other waterfowl species.

There are significant statistics relating to the contributions that croplands on refuges make to waterfowl management and the achievement of refuge purposes. Publications such as Reinecke, et al. (1989); McFarland, et al. (1966); Ringelman, et al. (1989); and others, have repeatedly validated the scientific importance of cropland management to waterfowl.

The success of these cropland management programs relates to the large body size of waterfowl enabling them to store fat, protein, and minerals. These reserves can be mobilized for egg formation, migration, molt, or in times of food shortage. Although strategies for depositing and using nutrient reserves differ among species, and are dependent upon the seasonal availability of foods, cropland grains are among the most extensively exploited food resources (Ringelman 1990).

Clutch size and perhaps nesting dates of mallards and Canada geese are thought to be directly related to the amount of reserves obtained on their wintering grounds. During breeding and molting periods, waterfowl require a balanced diet with high protein content. Grain crops, most of which are not very high in protein, are seldom used during these periods. However, during fall, winter, and early spring, when vegetative foods make up a large part of the diet and energy producing carbohydrates (hot foods) are the main nutritional requirement, grain crops such as corn and milo are preferred forage.

Standing crops, such as corn, are made available by mowing or knocking them down during post-hunting season periods. The intended purposes of reserving these crops are: (1) to provide sources of high energy foods to build fat reserves prior to migration; (2) to provide food resources on the refuge to minimize depredation of winter wheat crops on adjacent private lands; and (3) to minimize long distance travel to food during the coldest periods of the year.

Flight is the most energetic requirement for waterfowl, and by late January there are few areas left in the county where waterfowl have not already gleaned all waste grain thus necessitating long travel distances. For example, a 2.5-lb. mallard would require 3 days of foraging to replenish fat reserves following an 8-hour flight, if caloric intake were 480 kcal/day (the amount of intake from corn in an unharvested field) (Frederickson and Reid 1988). Refuge crops are mowed or knocked down at different intervals until the waterfowl have migrated north to ensure a constant supply of fresh feed from late January until mid-March.

AVAILABILITY OF RESOURCES:

The infrastructure (cropland, dikes, roads and storage facilities) are available at Eastern Neck NWR. Equipment is currently available through the Chesapeake Marshlands NWR Complex to facilitate the cooperative farming program. This means that they would not need to be procured, constructed, or created. No new equipment or equipment replacement would be anticipated during the 15 year expected duration of this plan.

COST BREAKDOWN:

The following is the list of annual costs the refuge requires to administer and manage the cooperative farming program.

Administration/Mowing (45 days @$180/day $3,000
Fuel/Equipment Maintenance $1,400

Total $4,400

ANTICIPATED IMPACTS ON REFUGE PURPOSE(S):

The following is a summary of the impact of this program as more thoroughly described in the Environmental Assessment prepared for the Eastern Neck NWR Comprehensive Conservation Plan of which this document is an attachment.

Effects on aquatic, wetland, and terrestrial habitats would be minimal. Again, only historical croplands would be cultivated. No new drainage systems would be created, and the actions used to minimize and mitigate runoff and erosion described above would result in very minor, if any, impacts on surrounding wetlands and aquatic systems.

Under implementation of the CCP, we will reduce cropland acreage from approximately 557 to 403 acres. Restoration of 154 acres of prior converted croplands to moist soil management impoundments and forested habitat would greatly improve the utilization of these lands for wildlife. Approximately, 145 acres of historical cropland on Eastern Neck NWR would be reforested to provide connective travel corridors thus minimizing forest fragmentation. An additional 22 acres would be converted to moist soil management to benefit waterfowl (see final CCP, Chapter 4, Objective 1.2.2 for further details).

The greatest impact of a cooperative farming program would be on wildlife populations, specifically wintering waterfowl, and to a lesser degree Neotropical migrants. Cooperative farming has been used extensively on national wildlife refuges to provide food for migrating and wintering waterfowl and to lessen depredations on private cropland.

Surveys at several refuges showed that about one-third of all feeding by waterfowl was on cultivated crops. Seventy-five percent of the geese and 30 percent of the ducks using national wildlife refuges in the Southwestern States were harbored on refuges where cropland management was practiced. Three million birds were maintained for several weeks in California on three small refuges totaling only 17,000 acres, where cropland management was practiced to minimize private cropland depredation (Givens, et al. 1964). These are significant statistics relating to the contributions that croplands on refuges make to waterfowl management and the achievement of refuge purposes. Publications such as Reinecke, et al. (1989); McFarland, et al. (1966); Ringelman, et al. (1989); and others, have repeatedly validated the scientific importance of cropland management to waterfowl.

Observations and censuses have demonstrated that many other resident and migratory bird species would also benefit from the cooperative farming program. In the summer, Eastern

meadowlarks and several sparrow species use the clover fields. Since the winter wheat would be left to mature, wild turkeys would use these fields as preferred nesting and brooding areas. Passerines seeking seeds or invertebrates would also heavily use the mature wheat. The eastern bluebird, in particular, seems to favor these areas during most of the year. Many species of raptors, including red-tailed hawks and kestrels, are often seen hunting in these areas.

Maintaining field borders would particularly benefit sparrow species, including song sparrows (*Melospiza melodia*), swamp sparrows (*Melospiza georgiana*), field sparrows (*Spizella pusilla*), chipping sparrows (*Spizella passerina*), white-throated sparrows (*Zonotrichia albicollis*), and savannah sparrows (*Passerculus sandwichensis*) (Marcus, et al. 2000). Fields with field borders contain approximately three times the sparrows than fields without borders.

The fields, specifically ladino clover, also provide foraging habitat for Lepidoptera during the summer and early fall migrations. This is particularly true when the fields are mowed, which continually provide clover blooms.

PUBLIC REVIEW AND COMMENT:

We released this compatibility determination for 52 days of public review and comment from September 9 to October 30, 2009 as part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Eastern Neck NWR. We also officially announced the availability of the draft plan for public comment in the *Federal Register* on September 9, 2009, as well as in media news releases and in a newsletter we distributed to approximately 1,000 individuals, state, federal and county agencies, organizations, and corporations on our CCP project mailing list. This level of public review fully complies with Service policy and NEPA. No change in this compatibility determination was warranted based on comments received.

DETERMINATION: (CHECK ONE)

___ Use is Not Compatible

_X_ Use is Compatible With the Following Stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Management will be in compliance with approved Best Management Practices and IPM plans. Cropland management has been conducted on Eastern Neck NWR annually since establishment in 1962. The attached list of general and special conditions is included in the cooperative farming agreement we issue each year and are required to ensure compatibility. If monitoring determines that this use materially interferes with or detracts from the Refuge System mission or purposes of the refuge, the use would be modified, curtailed or eliminated.

JUSTIFICATION:

Cooperative farming has been an integral management component for migratory waterfowl and trust species since Eastern Neck NWR was established in 1962. Utilizing croplands has benefited wintering and migratory waterfowl by providing a protected haven and sources of high energy foods to build fat reserves prior to migration. Due to wetland loss and degradation, natural food resources are inadequate on the Refuge, and very few and reliable "hot foods" are available off refuge. The cooperative farming program will not materially interfere with or detract from the purpose for which the refuge was established. It will contribute to the achievement of the refuge purpose and the National Wildlife Refuge System mission.

Signature: Refuge Manager _____ 3/5/2010
(Signature and Date)

Concurrence: Regional Chief _____ 3/24/10
(Signature and Date)

Mandatory 10-year Re-evaluation Date: March 24, 2010

ATTACHMENTS: 1) cooperative farming agreement general and special conditions;
2) land use map

COOPERATIVE FARMING AGREEMENT

General Conditions

A. RESPONSIBILITY OF COOPERATOR: (1) The Cooperator will furnish the seed, fertilizer, labor, materials, and equipment, and bear all expenses incident to the seeding planting, cultivating, and harvesting of all crops, unless otherwise specified in "Special conditions"; (2) The Refuge Manager must be notified at least three days in advance of any intended harvesting operation: and (3) the Cooperator agrees, by operating on the premises with all existing facilities, fixtures, or improvements, to maintain these facilities in their existing condition as of the date of this agreement. At the end of the period specified or upon earlier termination, he shall give up the premises in as good order and condition as when received except for reasonable wear, tear, or damage occurring without fault or negligence. The Cooperator will fully repay the Service for any and all damage directly or indirectly resulting from negligence or failure on his part, or the part of any of his associates to use reasonable care.

B. USE LIMITATIONS. The Cooperator's use of the described land is limited to the agricultural purposes indicated and does not unless provided for in this agreement, allow him to restrict other authorized entry to, or use of, this area including activities by the Service necessary for (1) protection and maintenance of the premises and adjacent lands administered by the Service and (2) the management of wildlife and fish using the premises and other Service lands.

C. DAMAGE. The United States shall not be responsible for any loss or damage to property including but not limited to growing crops, animals, and machinery; or injury to the Cooperator, or his relatives, or the officers, agents, employees, or any others who are on the premises by direction or by the consent of the Cooperator or his associates; or for any damages or interference caused by wildlife or employees or representatives of the Government carrying out their official responsibilities. The Cooperator agrees to save the United States or any of its agencies harmless from any and all claims for damages or losses that may arise or be incident to the flooding of the premises resulting from any associated Government river and harbor, flood control, reclamation, or Tennessee Valley Authority activity; PROVIDED, that when excess precipitation, or other natural phenomenon occurs prior to planting or during the growing season, alternate or supplementary crops may be planted and the yield may be divided in lieu of the crops and division originally specified herein.

D. OPERATING RULES AND LAWS. The Cooperator shall keep the premises in a neat and orderly condition at all times, and shall comply with all municipal, county, and State laws applicable to his operations under this agreement as well as all Federal laws and regulations governing National Wildlife Refuges and the areas described in this agreement. He shall comply with all instructions applicable to this agreement issued by the Refuge Manager. He shall take all reasonable precautions to prevent the escape of fires and shall render all reasonable assistance in the suppression of refuge fires.

E. COMPLIANCE. Failure of the Service to insist upon a strict compliance with any of the permit's terms, conditions, and requirements shall not constitute a waiver or be considered as giving up of the Service's right to thereafter enforce any of the permit's terms, conditions, or requirements.

F. REVOCATION POLICY. This agreement may be revoked by the Refuge Manager, upon written notice, for non-use or noncompliance with the terms, hereof, or for the violation of general and/or specific laws or regulations governing National Wildlife Refuges. The agreement is, however, at all times subject to discretionary revocation by the Director of the Service. Upon such revocation, the Service, by and through any authorized representative may take possession of the premises for its own and sole use: PROVIDED. That the Service shall make available to the Cooperator his rightful share of growing crops.

G. TERMINATION POLICY. If this agreement is terminated by consent of both parties, for lapse of time, or otherwise, the Cooperator shall immediately give up possession to the Service representative reserving the rights specified in section H, below. If he fails to do so, the Service may invoke such legal proceedings as may be appropriate.

H. REMOVAL OF COOPERATOR'S PROPERTY. Upon termination or expiration of this agreement, the Cooperator may, within a reasonable period as determined by the Refuge Manager, but not to exceed sixty days, remove all crops, materials, structures, and/or other equipment, except items furnished by the Service. Upon failure to remove any of the above items within the aforesaid period, they shall become the property of the United States.

I. TRANSFER OF PRIVILEGES. This agreement is not transferable and no privileges herein mentioned my be sublet or made available to any person or interest not mentioned in this permit. No interest hereunder may accrue through lien or be transferred to a third party without the approval of the Regional Director of the U.S. Fish and Wildlife Service and the permit shall not be used for speculative purposes.

J. OFFICIALS BARRED FROM PARTICIPATING. No member of Congress or Resident Commissioner shall participate in any part of this agreement or to any benefit that may arise from it, but this provision shall not pertain to this agreement if made with a cooperation for its general benefit.

K. NONDISCRIMINATION IN EMPLOYMENT. The Cooperator agrees to be bound by the equal opportunity clause of Executive Order 11246, which is attached hereto and made a part of this agreement.

Special Conditions

A. The cooperator may commence farming operation anytime after the agreement has been signed.

B. In order to allow for proper rotation of crops grown for the refuge by the Cooperator, specific, non-genetically modified crops must be seeded/planted and harvested according to the following schedule. Planting/harvesting may not occur during any of the refuge's designated deer hunting days (see Refuge Manager for hunt schedule). Any expected deviation from this schedule must be approved by the Refuge Manager at least two (2) weeks prior to the deadline.

Crop	Date to be Planted by	Date to be Harvested by
Ladino Clover	March 10	N/A
Corn	May 15	October 15
Soybean	July 31	November 14
Winter Wheat	October 15	July 31

C. Cooperator is responsible for the Nutrient Management Plan.

D. Cooperator may trap raccoons/woodchucks in accordance with State law and dispatch them humanely, as needed, to minimize crop depredation. Cooperator will coordinate with the Refuge Manger before conducting such management activities.

E. Cooperator must maintain a record and dates and rates of application of all fertilizers, herbicides, pesticides and lime as well as estimated harvest. Cooperator must submit this information to the Refuge Manager by December 15 each year.

F. The cooperator or his agent shall not apply any fertilizer, herbicide, or pesticide without prior approval of the Refuge Manger. **Cooperator may only apply types/amounts of fertilizer and pesticides that were submitted/approved in December of the previous year. If deviations in the type/amounts of fertilizer/pesticides are required, they must be approved by the Refuge Manager at least 2 weeks prior to application. Unapproved deviations from these pre-approved types/amounts of fertilizer/herbicide/pesticide is considered a serious violation of this agreement.**

G. The cooperator or his agent must read and strictly comply with all label instructions of any pesticide used. He must also remove from the refuge all empty pesticide containers resulting from his farming operation at the end of each day.

H. Johnson grass, mile-a-minute, and Canada thistle (noxious weeds) control will be the responsibility of the Cooperator in/around all leased fields, including waterways and filter strips within fields and buffer strips around fields. Prior to July 1, Canada thistle, mile-a-minute, and Johnson grass must be controlled with glyphosate to prevent seed production. After July 1, control should be by mowing as frequently as necessary to prevent seed production.

I. Cooperator shall leave a 15' buffer strip (minimum) free of crops 360° around each field, except for where a road exists, to allow Refuge vehicle access and help control nutrient run-off in conjunction with other best management farming practices. Waterways and buffer strips will not be tilled or planted. Cooperator shall maintain grassed waterways and buffer strips according to plans and specifications of the Soil Conservation Service (SCS). Refuge staff may also mow/maintain 15' buffer strips (minimum) and grassland waterways at their discretion.

J. Refuge share of crops will be determined by Refuge Personnel at least two weeks prior to the time of harvest and crops shall be left standing at the specified locations. Harvest may not commence until such sites/amounts are designated. The share will be based on yield and current market prices.

K. Cooperator shall park equipment left on the refuge only in designated areas. Chaff, excess soil, or other debris must be removed from equipment prior to parking at or near the maintenance area. Storage or parking of equipment or supplies must be approved by the Refuge Manager.

L. Cooperator will remove all equipment from Refuge property by November 15th of each year. No equipment is to be stored on Refuge property after this date.

M. Waste oil, oil filters, seed bags and other refuse must be removed from the refuge.

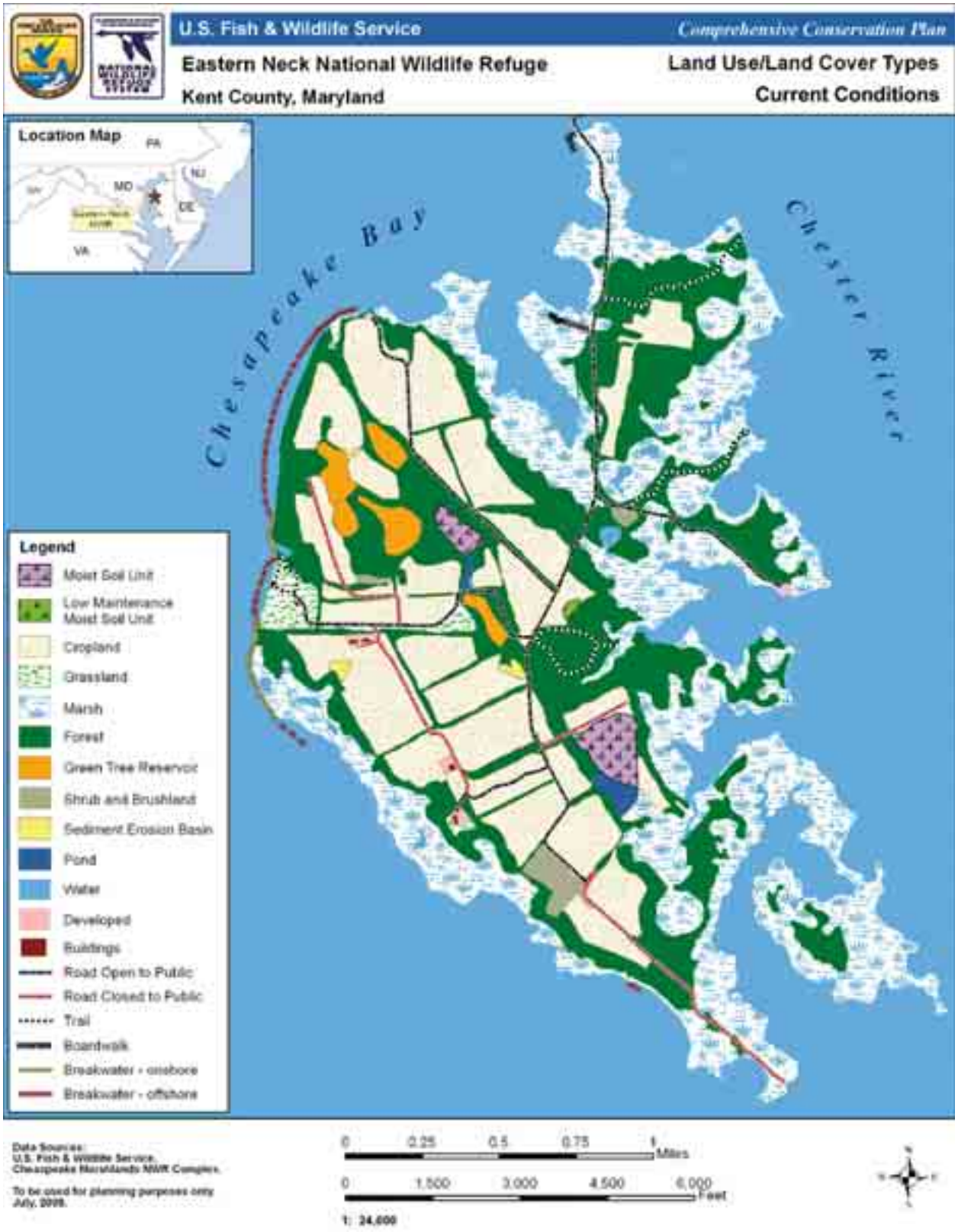
N. Cooperator is encouraged to double-crop soybean fields with winter wheat for harvest. Fields that are double-cropped must have wheat seeded by October 15 and be harvested by July 31. Fields that are not planted with a cover crop may be planted by Refuge staff.

O. Cooperator will plant winter wheat in corn fields, allow for geese usage throughout the winter, and harvest remaining wheat by July 31.

P. Cooperator will not fell or remove any trees that may fall into the fields without prior approval of the Refuge Manager.

Q. Within wheat fields also designated to be planted in clover, Cooperator may only apply herbicides and/or pesticides that have approved USFWS pesticide use permits (PUPs) and are formulated/approved to NOT harm clover.

Map B.3 Existing Land Use/Land Cover



REFERENCES CITED:

ACJV (Atlantic Coast Joint Venture). 2005. **Revised Waterfowl Implementation Plan, June 2005, Mid-Atlantic Region, Focus Area Description,** Chester River and Kent County Bayshore Focus Area.

Frederickson, L.H. and F.A. Reid.1988. Nutritional values of waterfowl foods. USFWS,

Waterfowl Management Handbook, Leaflet 13.1.1, Washington, D.C.

Givens, L.S., M.C. Nelson, and V. Ekedahl. 1964. Farming for waterfowl. Waterfowl Tomorrow. pp. 599–610.

Marcus, J.F., W.E. Palmer, and P.T. Bromley. 2000. The effects of farm field borders on overwintering sparrow densities. The Wilson Bulletin. 112(4). pp. 517–523.

McFarland, L.Z., and H. George. 1966. Preference of selected grains by geese. J. Wildl. Manage. 30:9–13.

Reinecke, K.J., R.M. Kaminski, D.J. Moorhead, J.D. Hodges, and J.R. Nassar. 1989. Mississippi alluvial valley. Pages 203–247 *in* L. M. Smith, R.L. Pederson, and R.M. Kaminski, eds. Habitat management for migrating and wintering waterfowl in North America. Texas Tech University Press. Lubbock, Texas

Ringelman, J.K. 1990. Managing agricultural foods for waterfowl. Fish and Wildlife Leaflet 13.4.3. Waterfowl Management Handbook. Washington, D.C.

Ringelman, J.K. 1990. Habitat management for molting waterfowl. Fish and Wildlife Leaflet 13.4.4. Waterfowl Management Handbook. Washington, D.C.

Ringelman, J.K., W.R. Eddleman, and H.W. Miller. 1989. High plains reservoirs and sloughs. Pages 311–340 *in* L. M. Smith, R.L. Pederson, and R.M. Kaminski, eds. Habitat management for migrating and wintering waterfowl in North America. Texas Tech University Press. Lubbock.

Appropriate Refuge Use: Operation of Ingleside Recreation Area by Kent County

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Eastern Neck National Wildlife Refuge

Use: Operation of Ingleside Recreation Area by Kent County

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?	✔	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✔	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✔	
(d) Is the use consistent with public safety?	✔	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✔	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✔	
(g) Is the use manageable within available budget and staff?	✔	
(h) Will this be manageable in the future within existing resources?	✔	
(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?	✔	
(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?	✔	

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 ✔ 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** ✔

Refuge Manager: [signature] Date: 3/5/2010

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: [signature] Date: 3/10/10

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

FWS Form 3-2319
02/06

COMPATIBILITY DETERMINATION

USE: Operation of Ingleside Recreation Area by Kent County

STATION NAME: Eastern Neck National Wildlife Refuge (Chesapeake Marshlands NWR Complex)

ESTABLISHING AND ACQUISITION AUTHORITIES:

The Chesapeake Marshlands National Wildlife Refuge Complex (CMNWRC) is composed of four nationally significant wildlife areas: Eastern Neck NWR, Blackwater NWR, Martin NWR, and Susquehanna NWR with several separate divisions.

Eastern Neck NWR was established by executive order on December 27, 1962, under the Migratory Bird Conservation Act (MBCA) (16 U.S.C. 715 d) "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." Additional tracts were acquired through 1966 under the MBCA authority to bring the refuge to its approved acquisition boundary containing 2,286 acres. By virtue of its strategic location at the confluence of the Chester River and the Chesapeake Bay, it is of significant value to migrating and wintering waterfowl on Maryland's Upper Eastern Shore.

REFUGE PURPOSE(S):

All tracts were acquired under the authority of the Migratory Bird Conservation Act (16 U.S.C. § 715 d), the purpose of the acquisition is "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

"To administer a national network of land and waters for the conservation, management, and where appropriate, the 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 Improvement Act of 1997, Public Law 105-57)."

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority use?
The Ingleside Recreation Area is administered by Kent County through their Commissioners for seasonal public recreation purposes to the extent compatible with wildlife requirements. The specific terms of this arrangement are specified in the Memorandum of Understanding between the USFWS, Department of the Interior and the County of Kent, Maryland established in 1975.

The MOU specifies that public recreation will be limited to photography, hiking, nature study, bicycling, and access to fin fishing, shell fishing, crabbing, wading and picnicking associated with such pursuits.

Most of the activities identified in the MOU are supported by the National Wildlife Refuge System Improvement Act of 1997 which identified six priority, wildlife-dependent recreational uses to be facilitated in the Refuge System. These activities are hunting, fishing, wildlife observation, interpretation, wildlife photography and environmental education. Activities such as hiking, bicycling, wading and picnicking help to facilitate the priority uses allowed.

(b) Where would the use be conducted?

This use will be conducted in the area called the Ingleside Recreation Area more specifically identified under item 1 in the MOU. This is an 11.2 acre tract of land located in the northwest portion of the refuge, adjacent to the Chesapeake Bay.

(c) When would the use be conducted?

The use of the Ingleside Recreation Area is limited to April 1 through September 30 during daylight hours. The area is closed during the rest of the year to provide protection to wintering and migrating waterfowl.

(d) How would the use be conducted?

A MOU between the Service and Kent County outlines the management agreement for the Ingleside Recreation Area. The County assumes the responsibility and costs of maintaining and operating the area. The maintenance will include restoration repairs, grading of roads and parking lots, mowing and garbage pickup. The county will be responsible for repairs and/or replacement of picnic tables existing on the area.

As described above the County's control is limited from April 1 through September 30 during daylight hours. After hours and during the closure period the Service will exercise jurisdiction and management authority.

(e) Why is the use being proposed?

Fishing, crabbing and shell fishing are historic uses of Eastern Neck Island and the Chesapeake Bay area. The shallow water area adjacent to the Ingleside Recreation Area is a shallow flat area that is ideal for these pursuits. Fishing along with the other activities allowed by the County at the Recreation Area are priority public use activities identified in the 1997 Refuge Improvement Act and the Service is encourage to facilitate these activities when compatible with refuge purposes. The County is interested in maintaining this historic use in this area and maintaining the Recreation Area. The MOU allows the area to remain open for public use while reducing the overhead cost to the Service.

AVAILABILITY OF RESOURCES

The cost in the management of this area is minimal to the Service. A minor amount of administrative costs are incurred on an annual basis to oversee the MOU and coordinate with County Official. Overall there is net benefit to the Service to be able to provide wildlife-dependent recreational opportunities with little cost to the refuge.

COST BREAKDOWN:

The following is a list of the annual costs the Refuge requires to administer the program:

Administrative costs. $1,500
Law Enforcement (25 hrs @ $24/hr) $600
Support costs (fuel, travel expenses). $300

Total $2,400

The following are one time facility costs:

Facility and Equipment costs:
Repair launching site at Ingleside Recreation Area $2,000

ANTICIPATED IMPACTS ON REFUGE PURPOSE(S):

Wildlife observation, photography, interpretation, and environmental education may affect the wildlife resource positively or negatively. A positive effect of public involvement in these priority public uses will be a better appreciation and more complete understanding of the refuge wildlife and habitats. Better public understanding may translate into more widespread, stronger support for Eastern Neck Refuge, the Refuge System and the Service. Modes of access (e.g. walking and biking) has the potential of impacting waterfowl, marshbirds and other migratory bird populations feeding and resting near the trails and on beaches during certain times of the year. Use of upland trails is more likely to impact songbirds than other migratory birds.

Short-term impacts: Anticipated impacts of the Ingleside Recreation Area are expected to be minimal. Although fishing and crabbing causes mortality to fish and crabs, season dates and limits are set with the long-term health of populations in mind. Populations of most species are regularly monitored by MD Department of Natural Resources staff and have determined that a controlled sport fishing harvest would not adversely affect overall fish population levels.

Recreational fishing opportunities may cause temporary disturbances such as the flushing of feeding, resting, or nesting birds, especially waterfowl, and other wildlife species. This disturbance

may displace individual animals to other parts of the refuge; however, this disturbance would be limited in scope due to the limited number of areas accessible to anglers. Most visitors understand the protection afforded by the Refuge, and the Service will continue to provide educational materials and adequate signage, to limit disturbance to waterfowl. Access for fishing is limited to the use of maintained roads and parking areas.

Visitors who are fishing and crabbing may introduce litter and lead sinkers that may harm shorebirds and waterfowl. No lead sinkers will be permitted during the Youth Fishing Derby to prevent lead poisoning to waterfowl or wading birds that use the Headquarters' Pond. Discarded fishing line and other fishing litter may entangle migratory birds and mammals and cause injury and death. This will be reduced through the use of monofilament recovery and recycling containers at fishing acces sites. Fisherman and crabbers, like other visitors, have the potential to damage vegetation and increase erosion.

Short-term impacts have an immediate effect on wildlife. The refuge priority uses and supporting activities (e.g. picnicking and bicycling) being evaluated may impose minor negative impacts on specific station physical resources such as trails and roads, and on natural resources such as vegetation and wildlife. Impacts may include erosion, deterioration, trampling, and temporary disturbance. Wildlife disturbances typically results in a temporary displacement without long-term effects on individuals or populations. Some species will avoid the areas people frequent, such as the developed roads, trails and the buildings, while others seem unaffected by or even drawn to the presence of humans. Regarding attracting wildlife, one concern is if trash, food, or fishing waste is left on site attracting wildlife to an unnatural food source, or attracting wildlife numbers that create a nuisance. These impacts are expected to be minimal and limited in time and duration as both Kent County and Refuge staff monitor trash and debris on a regular basis. Increased visitation and increased opportunities for consumptive and non-consumptive uses would also increase the likelihood of damage or disturbance of cultural and historic resources on the refuge. However, those effects should not be significant, because almost all public uses described herein occur on specific footprints on the refuge, such as refuge trails.

Long-term impacts: Long term impacts are anticipated to be minimal because only certain areas are open to the public, and sensitive areas, such as bald eagle nesting sites, will be closed as needed. An indirect long term impact is the potential for visitors to unintentionally introduce and/or spread invasive species. Once established, invasive plants can out-compete native plants, thereby altering habitats and impacting wildlife. The threat of invasive plant establishment will always be an issue, and will require annual monitoring, treatment and public education.

Cumulative impacts: Impacts may be minor when we consider them alone, but may become important when we consider them collectively. Our principal concern is repeated disruptions of nesting, resting, or foraging birds. Our knowledge and observations of the affected areas show no evidence that public use at Ingleside will adversely affect the wildlife resource. We also have not observed significant resource degradation, long-term consequences, or cumulative effects on any

of the refuges with established programs. However, opening refuge lands to public use can often result in littering, vandalism, or other illegal activities on the refuges. Although we do not expect substantial cumulative impact from public use at Ingleside in the near term, it will be important for refuge staff to monitor such uses and, if necessary, respond to conserve high-quality wildlife resources.

Refuge staff, in collaboration with volunteers, will monitor and evaluate the effects of public use at Ingleside to discern and respond to any unacceptable impacts on wildlife or habitats. To mitigate those impacts, the refuge will close areas where birds such as eagles are nesting.

Overall Refuge visitation may increase due to local tourism. Therefore, all uses on the Refuge may increase over time. However, fishing and crabbing is limited to specific areas so that it would have little cumulative impact with other uses. Fishing and crabbing will be monitored to see if the amount of use occurring on the Refuge is becoming too great. Therefore, there are no anticipated cumulative impacts.

PUBLIC REVIEW AND COMMENT:

We released this compatibility determination for 52 days of public review and comment from September 9 to October 30, 2009 as part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Eastern Neck NWR. We also officially announced the availability of the draft plan for public comment in the *Federal Register* on September 9, 2009, as well as in media news releases and in a newsletter we distributed to approximately 1,000 individuals, state, federal and county agencies, organizations, and corporations on our CCP project mailing list. This level of public review fully complies with Service policy and NEPA. No change in this compatibility determination was warranted based on comments received.

DETERMINATION: (CHECK ONE)

___ Use is Not Compatible

_X_ Use is Compatible With the Following Stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Compliance by Kent County with the terms of the MOU will ensure compatibility.

JUSTIFICATION:

Ingleside Recreation Area is not located in key habitats required for endangered species or other species of concern. Impacts to wintering migratory waterfowl are offset by closing the area October 1 to March 31 each year. The activities that take place in the Recreation are predominately wildlife-dependent and are supported by the 1997 Refuge Improvement Act. Other allowed activities facilitate or support the priority uses. Fiscal costs to the Service are nearly nonexistent but the fiscal benefits are significant by having the County responsible for the management of this area.

The operation of Ingleside Recreation Area of Eastern Neck NWR by Kent County will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which Eastern Neck NWR was established.

Signature: Refuge Manager 3/5/2010
(Signature and Date)

Concurrence: Regional Chief Anthony D Leger 3/24/2010
(Signature and Date)

Mandatory 10-year Re-evaluation Date: March 24, 2020

ATTACHMENT: Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING
BETWEEN THE
U.S. FISH AND WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR
AND THE
COUNTY OF KENT
MARYLAND

This UNDERSTANDING entered into by the Department of the Interior through the U.S. Fish and Wildlife Service, hereinafter referred to as the Service, and Kent County, Maryland, hereinafter referred to as the County, witnesseth that:

WHEREAS the Service, pursuant to the Recreational Use of Conservation Areas Act (Pub. L. 87-714, as amended; 16 U.S.C. 460k to 460k-4), is authorized to provide for recreational use of areas within the National Wildlife Refuge System to the extent that such use will not conflict with the primary purposes for which the areas were established; and

WHEREAS it is the desire of the parties of this Agreement to cooperate in the maintenance of the Ingleside Recreation Area, Eastern Neck National Wildlife Refuge, Kent County, Maryland, to be administered by the County through their Commissioners for seasonal public recreation purposes to the extent compatible with wildlife requirements; and

WHEREAS the County represents itself as authorized and willing to assume the responsibility and costs of maintaining and operating portions of the aforesaid Refuge more fully described hereinafter;

NOW, THEREFORE, it is mutually agreed, in consideration of the covenants and releases hereinafter contained, that

1. For the purposes of maintaining portions of the said Refuge, the Service grants to the County the seasonal use and control of the following lands:

Commencing at Corner 1 of the U.S. Tract (12) in the centerline of Eastern Neck Island Road, a 3/4" x 12" iron pipe set 1" below grade; thence N 27 degrees 30 > E with line 1-2 of said Tract (12), and along the center of Eastern Neck Island Road approximately 697 feet to Corner 1, the Place of Beginning, a point in the centerline of Eastern Neck Island Road and the junction of Ingleside Road; thence in a corridor 25' either side of the centerline of said Ingleside Road on a bearing N 44 degrees 30' W a distance of 3498 feet to a point in a curve; continuing with the centerline and corridor N 1 degree 30' W, 1510 feet to a point in the centerline adjoining a line of trees being Corner 2; thence in a line from Corner 2 with the line of trees N 77 degrees 30' E; 65 feet to Corner 3; N 2 degrees 00' W, 329 feet to Corner 4; N 5 degrees 30' E, 300 feet to Corner 5, a point in the mean high water line of the Chesapeake Bay; thence westerly with the said line of mean high water along the east shore of Chesapeake Bay approximately 1200 feet to Corner 6, a point in the mean high water line of Chesapeake Bay; thence in a line S 23 degrees 45' E, 30 feet to

Corner 7; S 70 degrees 00', 388 feet to Corner 8; S 12 degrees 30' E, 441 to Corner 9; S 41 degrees 45' E, 185 feet to Corner 10; S 75 degrees 30' E, 245 feet to Corner 11; S 57 degrees 30' E, 82 feet to Corner 12; N 77 degrees 30' E, 32 feet to Corner 2; thence on reciprocal bearings to the Place of Beginning, being a portion of U.S. Tract (15) containing 11.2 acres, more or less, exclusive of the access corridor acreage.

2. The County agrees not to use or to permit the use of said above-described lands or any portion thereof, for any purposes which is inconsistent or incompatible with the purposes herein specified, nor grant or assign any rights under this Agreement.

3. It is mutually understood and agreed that the United States has the sole right to grant rights and privileges on the above-described lands relative to uses or entry upon lands not specifically authorized by this Agreement and including, but not limited to, surface exploration or prospecting for minerals, geophysical surveys, easements or rights-of-way for roads, highways, pipelines, telephone lines, electric power transmission lines, or any public utilities and surveys incident thereto, etc., on or affecting the above-described lands.

4. The County agrees to notify promptly the Service through the Refuge Manager, Eastern Neck National Wildlife Refuge, of any intention to abandon the project.

5. The County shall not remove or permit to be removed sand, gravel, or any products of the land. The County shall not interfere with any person entering on the above-describe lands under the authority of the United States.

6. The County will take all reasonable action to protect and preserve the area and perform maintenance as may be required to prevent habitat destruction.

7. The County agrees to file an annual report to the Refuge Manager as of January 1, reciting the use made of the land and maintenance performed thereon, and expenditures made thereon during the preceding calendar year ending December 31.

8. The County will assume custody, maintenance, and use of the lands for public recreation purposes without restrictions as to race, creed, color, sex, or national origin. However, such public recreation will be limited to photography, hiking, nature study, bicycling, access to fin fishing, shell fishing, crabbing, wading, and picnicking associated with such pursuits. Pets will be permitted in designated parking areas if on a leash not exceeding ten feet in length.

9. The County will at the termination of the Agreement deliver up and surrender the property in as good a condition as of the date hereof.

10. The County will have seasonal control of the area from May 1 through September 30 during daylight hours. After hours and during the closed period the Service will exercise jurisdiction.

11. The County maintenance will include, but not be limited to, restoration repairs, grading of roads and parking lots, mowing and garbage pickup.

12. The County will have use of those picnic tables and permanent grills existing on the area. Subsequent repairs and/or replacement will be the responsibility of the County.

13. No powered watercraft of any kind will be launched from the Ingleside Recreation Area boat ramp with the exception of outboard driven craft with a rating of 5 HP or less.

14. No member of or delegate to Congress or resident commissioner shall be admitted to any share or part of this Agreement, or to any benefit to arise therefore, separate and apart from any benefit accruing to the general public.

15. All activities on the above described lands are subject to the laws and regulations governing uses of the National Wildlife Refuge System.

This Agreement shall become effective as of the date of a letter or notice from the Service informing the County that execution of the Agreement has been completed and that the above-described lands are available for use by the County. This Agreement shall remain in force for a period of five years with option of renewal for additional periods as may be mutually agreed upon by the Service and the County. At any time the County abandons the project or fails to utilize the lands for the purposes described herein, or at the discretion of the Service, the privileges herein granted may be revoked in whole or in part.

IN WITNESS WHEREOF the parties have executed this Cooperative Agreement on the day, month, and year opposite their signatures thereof.

THE COUNTY COMMISSIONERS OF KENT COUNTY, MARYLAND

BY: _____ DATE: _____
PRESIDENT

BY: _____ DATE: _____
MEMBER

BY: _____ DATE: _____
MEMBER

U.S. FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR

BY: _____ DATE: _____
REGIONAL DIRECTOR

Appropriate Refuge Use: Research Conducted by Non-Service Personnel

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Eastern Neck National Wildlife Refuge

Use: Research Conducted by Non-Service Personnel

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?	✔	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✔	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✔	
(d) Is the use consistent with public safety?	✔	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✔	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✔	
(g) Is the use manageable within available budget and staff?	✔	
(h) Will this be manageable in the future within existing resources?	✔	
(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?	✔	
(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?	✔	

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 ✔ 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** ✔

Refuge Manager: _____ Date 3/5/2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: 3/10/10

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

FWS Form 3-2319
02/06

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge: Eastern Neck NWR

Use: Research Conducted by Non-Service Personnel

JUSTIFICATION:

The Service encourages and supports research and management studies on refuge lands that will improve and strengthen decisions on managing natural resources. The refuge manager encourages and seeks research that clearly relates to approved refuge objectives, improves habitat management, and promotes adaptive management. Priority research addresses information on better managing the Nation's biological resources that generally are important to agencies of the Department of Interior, the National Wildlife Refuge System, and State Fish and Wildlife Agencies that address important management issues, or demonstrate techniques for managing species or habitats.

Researchers will be required to apply for a refuge special use permit and submit a final report to the refuge upon completion of their work. For long-term studies, we may also require interim progress reports. In addition, we ask researchers to present the findings of their work at the Annual Chesapeake Marshlands Science meeting in either a poster or oral presentation. We encourage researchers to publish their research in peer-reviewed publications. All reports, presentations, posters, articles or other publications will acknowledge the Refuge System and the Eastern Neck NWR as partners in the research. We will ask researchers to acknowledge the refuge to ensure that the research community, partners, and the public understand that the research could not have been conducted without the refuge having been established, its operational support, and that of the Refuge System.

Natural and cultural resources research has been determined to be an appropriate use on Eastern Neck NWR.

COMPATIBILITY DETERMINATION

USE: Research Conducted by Non-Service Personnel

STATION NAME: Eastern Neck National Wildlife Refuge (Chesapeake Marshlands NWR Complex)

ESTABLISHING AND ACQUISITION AUTHORITIES:

The Chesapeake Marshlands National Wildlife Refuge Complex (CMNWRC) is composed of four nationally significant wildlife areas: Eastern Neck NWR, Blackwater NWR, Martin NWR, and Susquehanna NWR with several separate divisions.

Eastern Neck NWR was established by executive order on December 27, 1962, under the Migratory Bird Conservation Act (MBCA) (16 U.S.C. 715 d) "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." Additional tracts were acquired through 1966 under the MBCA authority to bring the refuge to its approved acquisition boundary containing 2,286 acres. By virtue of its strategic location at the confluence of the Chester River and the Chesapeake Bay, it is of significant value to migrating and wintering waterfowl on Maryland's Upper Eastern Shore.

REFUGE PURPOSE(S):

All tracts were acquired under the authority of the Migratory Bird Conservation Act (16 U.S.C. § 715 d), the purpose of the acquisition is "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

"To administer a national network of land and waters for the conservation, management, and where appropriate, the 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 Improvement Act of 1997, Public Law 105-57)."

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority use?
Research and studies by non-Service personnel will be permitted throughout the refuge. The research will focus on the study of flora, fauna, ecology, cultural history, archaeological and public uses of Eastern Neck.

This use is not a priority public use, but these studies provide analysis and information about the biological, cultural, natural and public use history of the Eastern Neck ecosystem. Such information will be useful to managers making decisions on habitat management, public use, and related management decisions for the conservation of the natural resources of Eastern Neck NWR. Collections of water, soil, plants, and invertebrates will be allowed in conjunction with

research when appropriate. For each research project, a Special Use Permit will be prepared describing the specific research activities.

The Directors of the U.S. Fish and Wildlife Service (FWS) and the U.S. Geological Survey (USGS) have endorsed the guidelines and recommendations included in the 2006 final report of the National Ecological Assessment Team entitled "Strategic Habitat Conservation" which encourages the integration of scientific information with management decisions (FWS 2006). Similarly, "Fulfilling the Promise" published in 1999, explained the importance of conducting "good science" on lands managed by the National Wildlife Refuge System within the U.S. Fish and Wildlife Service (FWS 1999). Managers and biologists are required to demonstrate that sound scientific information is used to manage lands within the National Wildlife Refuge System. In addition, wildlife professionals are encouraged to follow the rigorous scientific guidelines as described by The Wildlife Society in their most recent publication entitled "Techniques for wildlife investigations and management" (Braun 2005). Collecting, analyzing, and using the most credible scientific information is vital to effectively managing lands within the National Wildlife Refuge System including Eastern Neck National Wildlife Refuge.

Managers and biologists are increasingly asked to provide quantitative scientific information to support management practices on lands managed by the National Wildlife Refuge System (Cooperrider 1986, FWS 2006). Scientific information is needed primarily in four areas including: (1) baseline inventory to determine the occurrence and spatial distribution of flora and selected fauna; (2) a long-term monitoring program to determine temporal trends in selected flora and fauna; (3) an adaptive management program to guide significant habitat and population management actions such as invasive species control, moist soil and cropland management, prescribed burning, marsh restoration, and forest management programs; and (4) detailed research in habitat-species relationships (e.g. waterfowl use of refuge habitats and habitat requirements for threatened and endangered species and forest interior dwelling species.

(b) Where would the use be conducted?

These studies will be conducted throughout the Eastern Neck National Wildlife Refuge. The exact locations of the studies will be determined by the focus of the study. Each proposal will be evaluated by refuge and Complex staff and other subject matter experts to determine the value of the study and study sites.

(c) When would the use be conducted?

Depending on the research project, activities could be conducted at any time throughout the year. Individual research projects may require one or two visits per year, while other projects may require daily visits. The time allowed for each project will be limited to the minimum required to complete the project. This activity will be limited during designated hunts. The Wildlife Trail and other non-hunt areas will be available during the hunts while other areas of the refuge will be closed to these activities due to safety concerns. If public use events, such as the annual fishing derby, conflict with research projects, the public use event shall be given priority as deemed appropriate by the Project Leader for the Chesapeake Marshlands NWR Complex.

The majority of research projects for flora would be conducted during the growing seasons (spring, summer, early fall). Research projects for fauna would be based on the life cycles and migration patterns of the organisms under study. For example, waterfowl use is heaviest during the fall

and winter while shorebird use is greater during the spring and late summer. Bat and amphibian surveys would be conducted during evening hours while forest interior dwelling bird species would be studied during the hours near sunrise.

(d) How would the use be conducted?
Researchers will be required to submit a written proposal, at least 60 days prior to the anticipated start of the research. The proposal will outline the methods, materials, timing, and justification for proposed project. These proposals will be reviewed by the Service to assess the appropriateness of the research for the Refuge, environmental impacts, assure that the projects do not interfere with other resources operations, and provide suggested modifications to the project to avoid disruptions to refuge wildlife and operations.

Research will be restricted to those projects that will be expected to enhance the body of knowledge about the natural and cultural history of the Eastern Neck ecosystem. Researchers will be expected to obtain and present any additional federal, state, and archaeological permits if applicable. We will not allow any research project that lacks an approved study plan and protocol or compromises public health and safety.

Some research studies may require access by boat. Boat access will be limited to public boat landings. Boat operators in Service boats must have taken and passed the Motorboat Operator's Certification Course (MOCC).

(e) Why is the use being proposed?
The Service encourages and supports research and management studies on refuge lands that will improve and strengthen decisions on managing natural resources. The refuge manager encourages and seeks research that clearly relates to approved refuge objectives, improves habitat management, and promotes adaptive management. Priority research addresses information on better managing the Nation's biological resources that generally are important to agencies of the Department of Interior, the National Wildlife Refuge System, and State Fish and Wildlife Agencies that address important management issues, or demonstrates techniques for managing species or habitats.

Scientific research is needed to follow the vision and direction outlined in Strategic Habitat Conservation (FWS 2006) and Fulfilling the Promise (FWS 1999) and to more effectively manage the natural resources at Eastern Neck NWR.

The refuge may also consider research for other purposes which may not be directly related to refuge-specific objectives, but would contribute to the broader enhancement, protection, use, preservation and management of populations of fish, wildlife and plants, and their natural diversity within the region or flyway. Such research projects may generate information that is relevant to management questions that may arise in the future or that may be useful to other refuges within the Complex or within Region 5. These proposals must comply with the Service's compatibility policy.

The refuge may develop a list of research needs that will be provided to prospective researchers or organizations upon request. Refuge staff interact with members of the scientific community on a regular basis and often generate ideas for future research projects through such interactions. Each year at the Chesapeake Marshlands NWR Complex Science Meeting, researchers and Complex staff discuss previous, current, and future research needs to assist FWS in managing their resources in the most effective and efficient ways possible. Refuge support of research directly related to refuge objectives may take the form of funding, in-kind services such as housing or use of other facilities, direct staff assistance with the project in the form of data collection, provision of historical records, conducting of management treatments, or other assistance as appropriate.

AVAILABILITY OF RESOURCES:

This activity can be supported within existing funding levels for the refuge. Any research projects that will be conducted by non-FWS staff will be reviewed, coordinated, processed and approved or modified under a Special Use Permit on a project by project basis.

COST BREAKDOWN:

The following is the list of annual costs to the Refuge and to scientific research partners to administer and mange the research program on an annual basis.

Refuge Personnel Costs
Protocol review (10 @ $30/hour) $300
Coordination with Research Partners (10 hrs @ $30/hr) $300
Special Use Permit development and review (5 hrs @ $30/hr) $150
Annual Science meeting (10 hours @ $30/hr). $300

Total $1,050

Non-Service Costs Provided by Partnerships, Grants, and Donations
Protocol development and review (1,000 hours @ $30/hour) $30,000
Coordination with Research Partners (100 hrs @ $30/hr) $3,000
Special Use Permit development and submission (50 hrs @ $30/hr) $1,500
Data collection and analysis (5,000 hrs @ $30/hr) . . . . . $ 150,000
Annual Science meeting (50 hours @ $30/hr). $1,500

Total $186,000

ANTICIPATED IMPACTS ON REFUGE PURPOSE(S):

Short-term impacts: Research activities may disturb fish and wildlife through observation, a variety of wildlife capture techniques, banding, and accessing the study area by foot or vehicle.

For example, the presence of researchers may cause disruption of birds on nests or breeding territories, or increase predation on nests. Efforts to capture birds may cause disturbance, injury, or death to groups or to individual birds. The energy cost of disturbance may be appreciable in terms of disruption of feeding, displacement from preferred habitat, and the added energy expended to avoid disturbance.

It is possible that direct or indirect mortality could result as a by-product of research activities. Mist-netting or other wildlife capture techniques, for example, may cause mortality directly through the capture method or intrap predation, and indirectly through capture injury or stress caused to the organism. If such mortalities do occur, there will be no impact to the overall population.

Wildlife habitats may also be impacted by research. Sampling activities may cause compaction of soils and the trampling of vegetation, the establishment of temporary foot trails and boat trails through vegetation beds, disruption of bottom sediments, and minor tree damage when equipment is temporarily placed. The removal of vegetation or sediments by core sampling methods may cause increased localized turbidity and disrupt non-target plants and animals.

Installation of posts, equipment platforms, collection devices and other research equipment in open water may present a hazard if said items are not adequately marked and/or removed at appropriate times or upon completion of the project. Negligible vehicle emissions, contaminants from vehicle fluids and very minor erosion from roads may result from vehicle access to the research sites.

Research efforts may also discover methods that result in a reduction in impacts described above. As new and innovative techniques become available, FWS will encourage researchers to use the least intrusive research methodologies and techniques.

Long-term impacts: No long-term impacts are expected and the Refuge Manager can control the potential for long-term impacts through Special Use Permits.

Cumulative impacts: Cumulative impacts would only occur if multiple research projects were occurring on the same resources at the same time or if the duration of the research is excessive. No cumulative impacts are expected and the Refuge Manager can control the potential for cumulative impacts through Special Use Permits. Managers retain the option to prohibit research on the Refuge which does not contribute to the purposes of the Refuge or the mission of the Refuge System, or causes undo resource disturbance or harm.

PUBLIC REVIEW AND COMMENT:

We released this compatibility determination for 52 days of public review and comment from September 9 to October 30, 2009 as part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Eastern Neck NWR. We also officially announced the availability of the draft plan for public comment in the *Federal Register* on September 9, 2009, as well as in media news releases and in a newsletter we distributed to approximately 1,000 individuals, state, federal and county agencies, organizations, and corporations on our CCP project mailing list. This

level of public review fully complies with Service policy and NEPA. No change in this compatibility determination was warranted based on comments received.

DETERMINATION: (CHECK ONE)

___ Use is Not Compatible

_X_ Use is Compatible With the Following Stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

- Collections will be restricted to permittees who have consulted refuge staff concerning special requirements needed to assure that the collections do not disrupt sensitive flora and fauna and to assure that collections do not disrupt refuge operations.
- Highly intrusive or manipulative research is generally not permitted in order to protect native wildlife populations and habitats in which they live.
- Permittees must present appropriate state and federal permits that may be required in addition to refuge permit.
- Research projects will follow all state of Maryland environmental and wildlife regulations.
- Field activities will be monitored to assure compliances with permit conditions and assess impacts.
- If the proposed research methods would impact or potentially impact complex resources (habitat or wildlife), it must be demonstrated that the research is necessary (i.e. critical to survival of a species, will enhance restoration activates of native species, will help in control of invasive species or provide valuable information that will guide future complex activities), and the researcher must identify the issues in advance of the impact.
- Research Special Use Permits will be issued only for bona-fide natural resource and cultural research purposes to individuals representing agencies, universities or other organizations.
- Researchers must clearly mark posts, equipment platforms, fencing material and other equipment left unattended so as to not pose a hazard. Such items shall be removed as soon as practicable upon completion of the research including flagging.
- Cultural and archeological surveys will be coordinated with the Regional Historical Preservation Officer and the appropriate State Historic Preservation Officer to assure compliance with the Archeological Resource Protection Act.
- All research activities will be performed in accordance with recommendations and guidelines described in the Special Use Permits for each research project.
- To the extent possible, within existing budget and personnel constraints, we will conduct research projects that promote the new vision and direction of the Fish and Wildlife Service as outlined in “Strategic Habitat Conservation: final report of the National Ecological and Assessment Team” (FWS 2006).

JUSTIFICATION:

Research is compatible with the mission and trust resource responsibilities of the U.S. Fish and Wildlife Service and is, in fact, necessary to effectively manage those trust resources. Research and monitoring activities have been conducted at Eastern Neck NWR since it was established in 1962.

Research by third parties plays an integral role in Refuge management by providing information needed to manage the Refuge on a sound scientific basis. Investigations into the biological, physical, archeological, and social components of the Refuge provide a means to analyze management actions, impacts from internal and outside forces, and ongoing natural processes on the Refuge environment. Research provides scientific evidence as to whether the Refuge is functioning as intended when established by Congress.

The Service encourages approved research to further understanding of refuge natural resources. Research by non- Service personnel adds greatly to the information base for refuge managers to make proper decisions. Research will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the Refuge was established.

Signature: Refuge Manager 3/5/2010
(Signature and Date)

Concurrence: Regional Chief Anthony D Léger 3/24/10
(Signature and Date)

Mandatory 10-year Re-evaluation Date: March 24, 2020

ATTACHMENTS: None

REFERENCES CITED:

Braun, C. E., editor. 2005. Techniques for wildlife investigations and management. Sixth edition. The Wildlife Society, Bethesda, Maryland, USA. 974pp.

Cooperrider, A. Y., R. J. Boyd, and H. R. Stuart, eds. 1986. Inventory and monitoring of wildlife habitat. U.S. Department of Interior, Bureau of Land Management Service Center, Denver, Colorado. xviii. 858pp.

Fish and Wildlife Service. 2006. Strategic Habitat Conservation: final report of the National Ecological Assessment Team. Fish and Wildlife Service Report, U.S. Department of the Interior. 45pp.

Fish and Wildlife Service. 1999. Fulfilling the Promise. Fish and Wildlife Service Report, U.S. Department of the Interior. 92pp.

Inappropriate Refuge Use: Berry Picking

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Eastern Neck National Wildlife Refuge

Use: Berry Picking

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?	✔	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✔	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✔	
(d) Is the use consistent with public safety?	✔	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✔
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✔	
(g) Is the use manageable within available budget and staff?		✔
(h) Will this be manageable in the future within existing resources?		✔
(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?		✔
(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?	✔	

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 ✔ 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** _____

Refuge Manager: _____ Date: 3/5/2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: 3/10/10

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

FWS Form 3-2319
02/06

JUSTIFICATION FOR A FINDING OF INAPPROPRIATENESS OF A REFUGE USE

Refuge: Eastern Neck National Wildlife Refuge

Use: Berry Picking

JUSTIFICATION:

Berry picking is not one of the six priority wildlife dependent recreational uses identified in the National Wildlife Refuge Improvement Act of 1997. This use does not appreciably contribute to the public's understanding and appreciation of the Refuge's natural and cultural resource, nor is the use beneficial to these resources.

This use can contribute to short-term disturbances of nesting birds and other wildlife, as well as trampling of native vegetation, compaction and erosion of sensitive habitats. Berry pickers will need to leave roads and trails to find berry producing plants. Numerous studies have confirmed that people can cause a variety of disturbance reaction in wildlife, including flushing or displacement, heart rate increases, altered foraging patterns and even in some cases, diminished reproductive success. Based on this information, it is likely that berry picking would have similar impacts.

Impacts to native vegetation could occur from movement of people over the landscape. Trampling of vegetation, erosion, littering and vandalism can result from increased public use. An indirect long term impact is the potential for visitors to unintentionally spread invasive species. Wineberry, a non-native invasive species that looks similar to raspberry, is present in dense thickets on the Refuge, and a popular berry picking plant. This plant poses a threat to native plants, and spreads by seed and vegetative means. Time and effort has been put into managing this species throughout the Refuge. Berry pickers may unintentionally spread this plant further on and off the Refuge by moving berries from one place to another. This would be counterproductive to refuge management activities and have a negative impact to refuge habitats.

Berry picking is determined to be an inappropriate use of Eastern Neck NWR based upon the above impacts to wildlife and native vegetation, concerns about potential spread of invasive species, and the fact that the use is not a priority wildlife dependent recreational activity.

Inappropriate Refuge Use: Competitive Events

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Eastern Neck National Wildlife Refuge

Use: Competitive Events

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?	✔	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✔	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✔	
(d) Is the use consistent with public safety?	✔	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✔
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✔	
(g) Is the use manageable within available budget and staff?		✔
(h) Will this be manageable in the future within existing resources?		✔
(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?		✔
(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?		✔

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 ✔ 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** _____

Refuge Manager: _____ Date: 3/5/2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: 3/10/10

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

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JUSTIFICATION FOR A FINDING OF INAPPROPRIATENESS OF A REFUGE USE

Refuge: Eastern Neck NWR

Use: Competitive Events

JUSTIFICATION:

Competitive events would include, but are not limited to, dog trials, cross country running, and bicycle racing. These uses are not wildlife dependent recreational uses under the National Wildlife Refuge Improvement Act of 1997. These events on refuges are not necessary for the safe, practical, and effective conduct of existing wildlife-dependent recreational uses. The effects of this use pose a threat to habitat and wildlife resources, and temporarily displace wildlife. Competitive events do not appreciably contribute to the public's understanding and appreciation of the Refuge's natural and cultural resource, nor is the use beneficial to the Refuge's resources. They would also impact other refuge uses which are wildlife dependent recreational uses.

Competitive events may also have impacts to the refuge's natural resources. These events can contribute to short-term disturbances of nesting and wintering birds and other wildlife due to the large number of people in attendance. Impacts to native vegetation may also occur from movement of dogs and people over the landscape. Invasive species could be spread further into marsh and forest habitats through the additional traffic. Increased erosion of trails and other sensitive areas could occur with the increased traffic that competitive events produce as well. Additionally, dog trials are prohibited by federal regulation (50 CFR 27.91).

Therefore these uses are not appropriate uses on Eastern Neck National Wildlife Refuge.

Inappropriate Refuge Use: Geocaching

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Eastern Neck National Wildlife Refuge

Use: Geocaching

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?	✔	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?		✔
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		✔
(d) Is the use consistent with public safety?	✔	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✔
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✔	
(g) Is the use manageable within available budget and staff?		✔
(h) Will this be manageable in the future within existing resources?		✔
(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?	✔	
(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?	✔	

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 ✔ 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** _____

Refuge Manager: [signature] Date: 3/5/2010

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: [signature] Date: 3/10/10

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

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JUSTIFICATION FOR A FINDING OF INAPPROPRIATENESS OF A REFUGE USE

Refuge: Eastern Neck NWR

Use: Geocaching

JUSTIFICATION:

Geocaching does not comply with existing Federal Regulations. The placement of any object on a National Wildlife Refuge is a violation of several Federal regulations including but may not be limited to the following:

16USC668dd, 50 CFR 27.93, Abandonment of Property
16USC668dd, 50 CFR 26.21a, Trespass
16USC668dd, 50 CFR 27.63, Search for and removal of other valued objects
16USC668dd, 50 CFR 27.97, Private Operations

Due to the historic and cultural resources within Eastern Neck NWR, geocaching could impact the Service's ability to protect and manage these resources. Finally, geocaching is not a wildlife dependent recreational activity and could potentially impact other refuge management activities on the refuge.

Based upon the above concerns, geocaching has been determined to be an inappropriate use on Eastern Neck NWR.

Inappropriate Refuge Use: Horseback Riding

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Eastern Neck National Wildlife Refuge

Use: Horseback Riding

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

Decision criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✔	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✔	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✔	
(d) Is the use consistent with public safety?	✔	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✔
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✔	
(g) Is the use manageable within available budget and staff?		✔
(h) Will this be manageable in the future within existing resources?		✔
(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?	✔	
(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?	✔	

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 ✔ 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** _____

Refuge Manager _____ Date: 3/5/2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: 3/10/10

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

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JUSTIFICATION FOR A FINDING OF INAPPROPRIATENESS OF A REFUGE USE

Refuge: Eastern Neck NWR

Use: Horseback Riding

JUSTIFICATION:

Horseback Riding is not a wildlife-dependent recreational activity and not one of the priority wildlife dependent public use activities identified in the 1997 National Wildlife Refuge System Improvement Act. Additionally, horseback riding could be a significant source for the introduction of invasive species on the refuge. Invasive species management is a major concern on Eastern Neck NWR and limiting a potential source of introduction is a major management objective.

Other management concerns that impact this use are 1) that the refuge does not have appropriate parking facilities to accommodate the use; 2) there are not adequate trails on the refuge to accommodate horseback riding and; 3) adding horseback riding to a small island could cause conflicts with other wildlife-dependent public uses as well as management activities.

Therefore, horseback riding has been determined as an inappropriate use on Eastern Neck NWR.

Inappropriate Refuge Use: Non-Service Group Events

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Eastern Neck National Wildlife Refuge

Use: Non-Service Group Events

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?	✔	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✔	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✔	
(d) Is the use consistent with public safety?	✔	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✔
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✔	
(g) Is the use manageable within available budget and staff?		✔
(h) Will this be manageable in the future within existing resources?		✔
(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?		✔
(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?	✔	

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 ✔ 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** _____

Refuge Manager: SCBail Date: 3/5/2010

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: Douglas M. Rees Date: 3/10/10

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

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JUSTIFICATION FOR A FINDING OF INAPPROPRIATENESS OF A REFUGE USE

Refuge: Eastern Neck NWR

Use: Non-Service Group Events

JUSTIFICATION:

Non-Service group events would include, but are not limited to, weddings, funerals, family reunions, birthday parties, etc. These ceremonies are not wildlife dependent recreational uses under the National Wildlife Refuge Improvement Act of 1997. They do not appreciably contribute to the public's understanding and appreciation of the Refuge's natural and cultural resource, nor is the use beneficial to these resources.

Non-Service group events may also have impacts to the refuge's natural resources. These events can contribute to short-term disturbances of nesting and wintering birds and other wildlife due to the large number of people in attendance. Impacts to native vegetation could occur from movement of people over the landscape. Trampling of vegetation, erosion, littering and vandalism can result from large groups of people. Therefore, non-Service group events have been determined as inappropriate uses of Eastern Neck National Wildlife Refuge.

Inappropriate Refuge Use: Swimming and Sunbathing

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Eastern Neck National Wildlife Refuge

Use: Swimming and Sunbathing

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?	✔	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✔	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✔	
(d) Is the use consistent with public safety?	✔	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✔
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✔	
(g) Is the use manageable within available budget and staff?		✔
(h) Will this be manageable in the future within existing resources?		✔
(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?		✔
(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?		✔

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 ✔ 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** _____

Refuge Manager: _____ Date: 3/5/2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: 3/10/10

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

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JUSTIFICATION FOR A FINDING OF INAPPROPRIATENESS OF A REFUGE USE

Refuge: Eastern Neck NWR

Use: Swimming and Sunbathing

JUSTIFICATION:

Swimming and sunbathing are not wildlife dependent recreational uses under the National Wildlife Refuge Improvement Act of 1997. The uses may disturb current priority public uses on the refuge. Many refuge visitors use some of the areas where swimming and sunbathing would take place for wildlife observation, interpretation and wildlife photography.

Wildlife and their habitats may be impacted by swimming and sunbathing. Chronic disturbance may partly or entirely displace birds from sensitive areas. Heavy use of the beachfront from this activity may result in significant build up of trash on refuge shorelines.

Swimming and sunbathing have never been allowable uses at Eastern Neck NWR. These uses have been determined to be inappropriate uses of the refuge.

Appendix C

Jonathan Priday/USFWS

Spray treatment of Phragmites *using a Marsh Master*

Refuge Operations Needs System (RONS) and Service Asset Maintenance Management System (SAMMS)

Refuge Operations Needs System (RONS)

Table C.1. Projects currently in or planned for RONS database for Eastern Neck NWR

Project Description	Project ID	Refuge Rank	Cost One-time/Reoccurring		FTE*
Improve Biological Capabilities and Facility Management on the Refuge	FY08-5688	1	—	$77,321	1.0
Provide Resource, Facility and Visitor Protection (Law Enforcement)	FY08-6732	2	—	$97,292	1.0
Forest Habitat Improvements	FY08-5749	3	$230,000	$10,000	0.0
Improve Efficiency and Effectiveness of Refuge Croplands and Forests	FY08-5742	4	$155,000	—	0.0
Riparian Habitat Improvement	FY08-5744	5	$75,000	—	0.0
Alternative Energy Infrastructure	FY08-5745	6	$70,000	—	0.0
Re-establish Submerged Aquatic Vegetation/ Shellfish Beds	FY08-6543	7	$540,000	$10,000	0.0
		Totals	**$1,070,000**	**$194,523**	**2.0**

**Full-time Equivalency*

Service Asset Maintenance Management System (SAMMS)

Table C.2. Projects currently in or planned for SAMMS database for Eastern Neck NWR

Project Description	Project Work Order	Cost ($1,000)
Replace Power Systems with Renewable Energy	01113400	$30.2
Construct Accessible Boat Ramp and Environmental Education Facility	04133339	$235.0
Rehabilitate Lodge Interior and Exterior	04133427	$255.0
Headquarter Parking Area Improvements	2005218695	$130.0
CE Lodging	2005221992	$15.0
CE Entrance	2005221995	$35.0
Replace Facility #64 with Renewable Energy	2006505904	$298.0
Construct Informational Kiosk at Bogles Wharf	2007733559	$15.0
Replace Ingleside Water Control Structure	2008865807	$71.0
Replace Water Control Structures	2008865831	$95.0
Rehabilitate Boardwalk by Replacing Decking	2008865834	$150.0
Rehabilitate Residence Interior and Exterior	2008865836	$84.0
Rehabilitate Rutted Gravel Shop Road	2008865863	$33.0
Rehabilitate Rutted Lodge Road	2008865865	$57.0
Rehabilitate Rutted Shipyard Creek Trail	2008865868	$57.0
Construct Cedar Point Shoreline Protection/Restoration	2009928013	$1,000.0
Construct Tubby Cove Shoreline Protection/Restoration	2009928017	$1,000.0
Replace Gate	92105193	$43.0
Replace Entrance Road Culverts	94105190	$54.0
Rehabilitate Entrance Road (1 miles)	98105172	$33.0
Replace Interpretive Signs	98105182	$27.0
Remove and Replace Old Metal Storage Building	98105183	$213.0
Rehabilitate Tubby Cove Trail	98105184	$19.0
Rehabilitate Cedar Point Road/Trail	99105191	$80.0
Construct Kiosks	99123790	$20.0
	Total	**$4049.2**

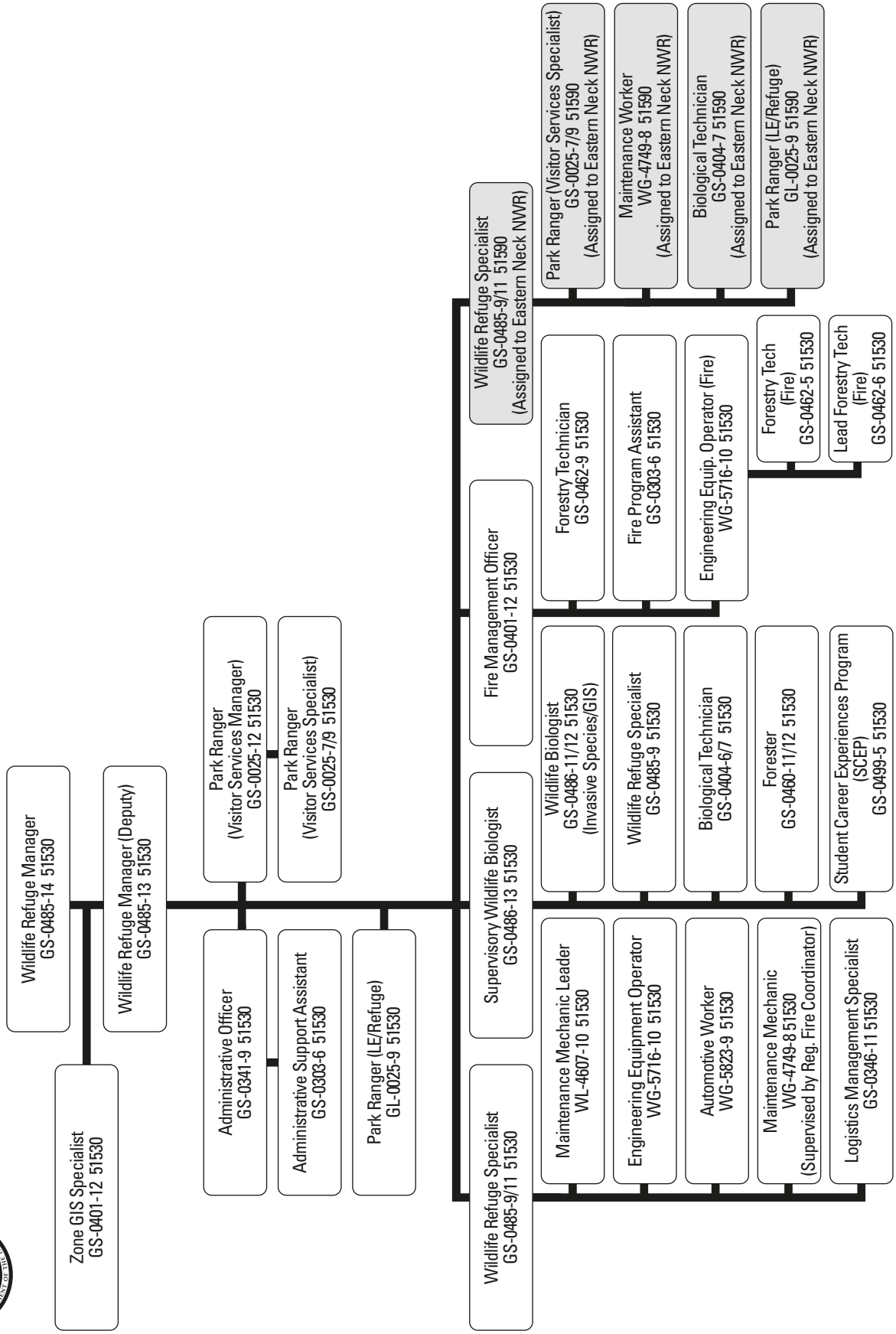
Appendix D

USFWS

BayScape garden on the refuge

Refuge Staffing Chart

Proposed Staffing Chart
Chesapeake Marshlands NWR Complex
(includes Eastern Neck, Blackwater, Martin and Susquehanna NWRs



Appendix E

USFWS

Using prescribed fire to improve refuge habitats

Fire Management Program Guidance

Introduction

The mission of the National Wildlife Refuge system 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" as stated in the National Wildlife Refuge Improvement Act (October 9, 1997)

The Role of Fire

Historically, natural fire and ignitions by Native American people played an important disturbance role in many ecosystems by removing fuel accumulations, decreasing the impacts of insects and diseases, stimulating regeneration, cycling nutrients, and providing a diversity of habitats for plants and wildlife.

In the heavily manipulated areas of the northeast U.S. that role has been modified significantly. However, when fire is used properly it can—

- reduce hazardous fuels build-up in both Wildland-urban interface (WUI) and in non-WUI areas;
- improve wildlife habitats by reducing the density of vegetation, and/or changing plant species composition;
- sustain and increase biodiversity;
- improve woodlands and shrublands by reducing plant density;
- reduce the susceptibility of plants to insect and disease outbreaks;
- assist in the control of invasive and noxious species.

Wildland Fire Management Policy and Guidance

In 2001, the Secretaries of the Interior and Agriculture approved an update of the 1995 "Federal Fire Policy." The 2001 "Federal Wildland Fire Management Policy" directs federal agencies to achieve a balance between fire suppression to protect life, property and resources, and fire use to regulate fuels and maintain healthy ecosystems. It also directs agencies to use the appropriate management response for all Wildland fire regardless of the ignition source.

This policy provides 9 guiding principles that are fundamental to the success of the fire management program. Firefighter and public safety is the first priority in every fire management activity. The role of wildland fires as an ecological process and natural change agent will be incorporated into the planning process.

Fire management plans (FMPs), programs and activities support land and resource management plans and their implementation. Sound risk management is the foundation for all fire management activities. Fire management programs and activities are economically viable, on the basis of values to be protected, costs, and land and resource management objectives. FMPs and activities are based on the best available science. FMPs and activities incorporate public health and environmental quality considerations Federal, state, tribal, local, interagency and international coordination and cooperation are essential Standardization of policies and procedures among federal agencies is an ongoing objective

The fire management considerations, guidance, and direction should be addressed in the land use resource management plans (for example, the CCP). The FMP is a step-down plan derived from the land use plans and habitat plans, with more detail on the fire suppression, fire use and fire management activities.

Management Direction

Eastern Neck NWR as part of the Chesapeake Marshlands NWR Complex will protect life, property, and other resources from wildland fire by suppressing all wildfires. Prescribed fire in conjunction with chemical, manual and mechanical fuel treatments will be used in an ecosystem context to protect federal and private property, for habitat management purposes. Fuel reduction activities will be applied in collaboration with federal, state and nongovernmental organizations partners.

Prescribed fire will be used as a management tool to promote and accomplish the goals set forward in the Comprehensive Conservation Plan:

- Protect and enhance Service Trust Resources and Species and Habitats of Special Concern.
- Maintain a healthy and diverse complex of natural community types comprised of native plants and animals to pass on to future generations of Americans.
- Conduct effective outreach activities and develop and implement quality, wildlife dependent public use programs, with the emphasis on wildlife observation, and photography, to raise public awareness of the refuge and the refuge system, and to promote enjoyment and stewardship of natural resources in the Chesapeake Bay region.

All aspects of the fire management program will be conducted in a manner consistent with applicable laws, policies, and regulations. Eastern Neck NWR will maintain a FMP to accomplish the fire management goals that follow (see Fire Management Goals). Prescribed fire, chemical, manual and mechanical fuel treatments will be applied in a scientific way, under selected weather and environmental conditions.

Fire Management Goals

The goals and strategies of the National Wildlife Refuge System Wildland fire Management Program Strategic Plan are consistent with Department of Interior (DOI) and the U.S. Forest Service policies, National Fire Plan direction, the President's Healthy forest Initiative, the 10 year Comprehensive Strategy and Implementation Plan, National Wildfire Coordinating Group (NWCG) Guidelines, initiatives of the Wildland Fire Leadership Council, and Interagency Standards for Fire and Aviation operations.

The fire management goals for the Refuge are to use prescribed fire, chemical, and manual and mechanical treatments to:

- reduce the threat to life and property through hazardous fuels reduction treatments; and
- meet the habitat goals and objectives identified in this CCP.

Fire Management Objective

The purpose of the fire management program is to use prescribed fire, chemical, and manual and mechanical treatment to:

- Ensure public and firefighter safety while protecting property and natural resource values from wildfire.
- Reduce the wildfire impacts to all resource management activities. Reduce the threats associated with accumulations of hazardous fuel loads in marsh and woodland habitats.
- Provide and enhance and protect habitats for State and Federal endangered and threatened species and species of special concern.

- Provide, maintain, enhance, and protect feeding, resting, nesting and brood habitat that meet the requirements of migratory waterfowl, other migratory birds, and resident wildlife.
- Maintain health and vigor of marsh vegetation
- Facilitate the control of invasive and exotic species.
- Increase habitat diversity in refuge woodland habitats.
- Demonstrate and educate the public about the role and benefits of Wildland fire protection and prescribed fire use in natural resource management
- Maintain current ecosystem diversity within the landscape context, and contribute to the recovery and restoration of the Chesapeake Bay ecosystem.
- Comply with State Air Quality Implementation Plans to protect public health and the environment.

Strategies

The refuge will use strategies and tactics that consider public and firefighter safety as well as resource values at risk. Wildland fire suppression, prescribed fire methods, chemical, manual and mechanical means, timing, and monitoring are described in more detail within the step-down FMP.

Prescribed fire burn plans will be developed for specific sites, following the interagency Prescribed Fire planning and Implementation Procedures Reference Guide (2006) template.

Prescribed fire temporarily reduces air quality by diminishing visibility and releasing components through combustion. The Refuge will meet the Clean Air Act emission standards by adhering to the Maryland Air Quality requirements during all prescribed fire activities.

Fire Management Organization, Contacts, and Cooperation

Fire management technical oversight for the refuge has been established in Region 5 of the Service, using the fire management zone approach. Under this approach, fire management staff has been determined by established modeling systems based on fire management workload of a group of refuges, and possibly interagency partners. The fire management workload consists of historical wildland fire suppression activities, as well as historical and planned hazard fuels treatments. At this time, Eastern Neck NWR is within a fire management zone, which includes all the national wildlife refuges in Maryland and Delaware. The primary fire management staffing and support equipment are located at the Blackwater NWR, and are shared among all units. Depending upon budgets and the qualifications of personnel assigned to Eastern Neck NWR, fire qualified individuals may be available at the refuge in the future. All fire management activities are conducted in a coordinated and collaborative manner with the refuge and other federal and nonfederal partners. The fire management zone has developed a close working relationship with the Maryland Department of Natural Resources Forest Service and regularly works jointly on fire projects. Initial attack of any wildfire is carried out by the Maryland Forest Service and Kent County Volunteer Fire Companies under cooperative agreements in place among the agencies.

Upon approval of this CCP, a new FMP will be developed for the Refuge. The FMP may be done as an FMP that covers only Eastern Neck NWR or an FMP that covers all the refuges in the Complex.

Appendix F

USFWS

Delmarva fox squirrel

Intra-Service Endangered Species Act Compliance

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Suzanne Baird, Refuge Manager, Chesapeake Marshlands National Wildlife Refuge Complex.

Signature:

Telephone Number: 410-228-2692 ext. 101

Date:

I. Service Activity (Program) and Proposed Activity – NWRS, Eastern Neck National Wildlife Refuge CCP/EA

Refuges are required by the Refuge Improvement Act of 1997 to complete a Comprehensive Conservation Plan (CCP) and by the National Environmental Policy Act to complete an Environmental Assessment to accompany the CCP. The combined documents serve to guide refuge management decisions over the next 15 years, and inform the public and other interested parties, agencies, partners, communities of these plans. The Eastern Neck NWR CCP/EA document explains the refuge mission and goals, describes the affected environment at the time of writing, offers 3 alternatives to management, describes the environmental consequences on the major habitat types for each alternative, and summarizes the consultation and coordination with others throughout this process. The primary distinctions between the alternatives are outlined on page 101 in chapter 3 of the CCP. The document can be downloaded from the site: http://www.fws.gov/Northeast/planning/Eastern%20Neck/ccphome.html

II. Pertinent Species and Habitat within Action Area: (Listed species/critical habitat, proposed species/proposed critical habitat, and candidate species). Include species/habitat occurrence on a map*.

Delmarva Fox Squirrel; DFS (*Sciurus niger cinereus*)
*Species distribution is limited. There have only been one or two confirmed sightings in the past few years.

The Federal-listed endangered Delmarva fox squirrel has been present on the refuge since its introduction to the island by hunters in the 1920's. Their numbers have declined to the point where there are typically ≤ 1 sighting per year. This is not entirely unexpected because it is an island population, isolated from any other source populations. Stochastic events can drive isolated populations to extinction if there are no adjacent populations to recolonize from. For this reason, over the last several years, we have not pursued active management for this species, and together with the recovery team, have determined that the refuge population is no longer deemed essential to its recovery. It is important to recognize that Delmarva fox squirrels translocations to other sites in Kent County and elsewhere

on the Delmarva Peninsula have been very successful and the species is now on the brink of recovery.

III. Geographic area or station name and action: Eastern Neck National Wildlife Refuge; Chesapeake Marshlands National Wildlife Refuge Complex

IV. Location (Attachment 1) - County and State; section, township, and range (or latitude and longitude); distance (miles) and direction to nearest town:

Kent County, Maryland; approximately 10 miles south of Rock Hall, Maryland. See attached map.

V. Determination of effects:

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

Across all three alternatives, and particularly the preferred alternative (Alternative B), we describe protection of habitat that is suitable for DFS. Additionally, the preferred alternative includes reforestation projects and maintenance of some agricultural fields that should create or maintain the ability of the refuge to support DFS if the population rebounds. None of the alternatives include impacts to mature forest that would adversely impact potential DFS populations.

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

Alternatives that include agriculture may allow some management of problem animals in fields, primarily raccoons and ground hogs. Management options would be restricted to live trapping and/or shooting to assure no impact to DFS.

None of the alternatives include actions that will significantly reduce the amount of mature forest habitat for potential DFS populations on the refuge.

The refuge will take measures to reduce the use of pesticides, and utilize other management techniques where available in the invasive species and agricultural programs to ensure that there will be no effect on potential DFS populations.

A. Listed species/designated critical habitat:

Determination	**Response requested**
no effect/no adverse modification (species: Delmarva Fox Squirrel)	**X *Concurrence**
may affect, but is not likely to adversely affect species/adversely modify critical habitat (species: _____)	**____Concurrence**
may affect, and is likely to adversely affect species/adversely modify critical habitat (species: _____)	**____Formal Consultation**

B. Proposed species/proposed critical habitat:

Determination	**Response requested**
no effect on proposed species/no adverse modification of proposed critical habitat (species: _____)	**____*Concurrence**
is likely to jeopardize proposed species/adversely modify proposed critical habitat (species: _____)	**____Conference**

C. Candidate species:

Determination	**Response requested**
no effect (species: _____)	**____*Concurrence**
is likely to jeopardize candidate species (species: _____)	**____Conference**

12/2/2009

signature **date**

[Title/office of supervisor at originating station]

IX. Reviewing ESO Evaluation:

A. Concurrence X **Nonconcurrence** _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

Lee A. Hagen 12/14/07

signature **date**

[Title/office of reviewing official]

ATTACHMENT 1

Appendix G

USFWS

Refuge headquarters

National Historic Preservation Act Compliance

Maryland Department of Planning
Maryland Historical Trust

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

Richard Eberhart Hall
Secretary

Matthew J. Power
Deputy Secretary

October 16, 2009

Ms. Nancy L. McGarigal
Planning Team Leader
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035-9589

Re: Comprehensive Conservation Plan (CCP) for
Eastern Neck National Wildlife Refuge
Kent County, Maryland

Dear Ms. McGarigal:

Thank you for providing the Maryland Historical Trust (Trust) with a copy of the following draft document, for review and comment: *Eastern Neck National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment* (September 2009).

The Trust, Maryland's State Historic Preservation Office, reviewed the document with particular focus on those sections of the CCP that deal with the Refuge's historic and archeological resources. The CCP includes pertinent goals and objectives to address the protection and appropriate treatment of the Refuge's cultural resources. The Trust fully supports the historic preservation objectives outlined for the alternatives in the CCP. For archeological resources, the measures that will particularly help ensure resource protection include: completing prioritized archeological surveys of the property to gain a better understanding of its archeological record; implementing shoreline erosion protection projects to diminish site loss from erosion; and establishing a law enforcement position with relevant training to enforce ARPA and reduce site disturbance from looting. For the Refuge's historic structures, implementing a staffed program of routine maintenance and repairs in keeping with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Part 68) will help ensure long term protection and continued viable use of these built resources.

We look forward to working with the USFWS to ensure the appropriate stewardship of cultural resources in the implementation of the CCP for Eastern Neck NWR and address relevant responsibilities under Sections 106 and 110 of the National Historic Preservation Act of 1966. If you have questions or need further assistance, please contact Amanda Apple (for historic built environment) at 410-514-7630 / aapple@mdp.state.md.us or me (for archeology) at 410-514-7631 / bcole@mdp.state.md.us. Thank you for providing us this opportunity to comment.

Sincerely,

Elizabeth J. Cole
Administrator, Project Review and Compliance

EJC/200903542
cc: John Wilson (USFWS)
Susan Baird (Refuge Manager, Chesapeake Marshlands NWR Complex)

100 Community Place Crownsville, Maryland 21032-2023
Telephone: 410.514.7600 Fax: 410.987.4071 Toll Free: 1.800.756.0119 TTY Users: Maryland Relay
Internet: www.marylandhistoricaltrust.net

Appendix H

Donna Dewhurst/USFWS

Greater scaup

Summary and Response to Public Comments

Summary of Public Comments and Service Responses on the Draft Comprehensive Conservation Plan and Environmental Assessment for the Eastern Neck National Wildlife Refuge

February 26, 2010

Introduction

In September 2009, we completed the "Eastern Neck National Wildlife Refuge Draft Comprehensive Conservation Plan and Environmental Assessment" (Draft CCP/EA). That draft refuge plan outlines three alternatives for managing the refuge over the next 15 years, and identifies Alternative B as the "Service-preferred Alternative." We released the plan for 52 days of public review and comment from September 9 to October 30, 2009. We officially announced the availability of the draft plan for public comment in the *Federal Register* on September 9, 2009, as well as in media news releases and in a newsletter we distributed to approximately 1,000 individuals, state, federal and county agencies, organizations, and corporations on our project mailing list.

We evaluated all the letters and e-mails sent to us during that comment period, along with comments recorded in two public meeting sessions in Rock Hall, Maryland on September 24, 2009. This document summarizes all of the comments and provides our responses to them. Based on our analysis in the Draft CCP/EA, and our evaluation of the comments, we modified Alternative B and recommend it to our Regional Director for implementation. It is that modified Alternative B which we detail in this CCP. Our modifications include additions, corrections, and clarifications to our preferred management actions. All of these changes fall within the scope and context of actions analyzed in one or more alternatives in the Draft CCP/EA. As such, we have also determined that none of those changes warrants our publishing a revised or amended Draft CCP/EA before publishing the CCP.

These are some important changes in the final plan.

1. We re-evaluated the locations for new moist soil units (MSU's) originally proposed in Alternative B of the Draft CCP/EA. Based on public comment, and a recent field review with MD DNR and refuge staff, our new plan is to create three larger MSU's, instead of 4 smaller ones, to meet the approximately 22-acre objective we proposed in the draft plan for new MSU's. The new MSU's would all be in fields we plan to maintain in cropland, instead of placing two of them in an area we plan to manage as forest. We identify tentative locations on our new map (CCP map 4-1), but final selection will depend on soils and engineering testing, a cultural resource evaluation, and a cost/benefit assessment. In the near term, we will focus on monitoring the year-round wildlife use and effectiveness of the existing MSU's, especially the Shipyard Creek location, to learn from those projects before constructing new ones.

2. We will maintain an additional 31.5 acres in cropland over what we proposed in Alternative B of the Draft CCP/EA. These acres are currently in cropland and are fields that: receive high wildlife use; lie along public access roads where they facilitate public viewing opportunities; include areas we are evaluating for new MSU sites; and, are in locations that would not detract from our objective to consolidate forest habitats. Map 4-1 depicts our habitat management objectives for the CCP.

3. We will maintain two hedgerows that we proposed to remove in Alternative B of the Draft CCP/EA. Based on public comment, and after the field review mentioned above, we determined there were several reasons to keep these in place. First, these hedgerows, which are near refuge headquarters, would help protect soils from wind and storm events in the refuge's largest crop field. Second, their size and composition, and the fact that invasive plants are not dominant, adds to the refuge's wildlife habitat diversity. Third, they lie along a main public access road where they facilitate public viewing opportunities. In addition, we will enhance these forested strips as needed, for example planting young trees and/or treating invasive plants, in order to sustain them as quality wildlife habitat.

4. In conjunction with #3 above, we have decided not to move the headquarters entrance road as proposed in Alternative B of the Draft CCP/EA since it will no longer lie in the middle of a large crop field. Instead, we will evaluate waterfowl use in that portion of the crop field between the hedgerow and the road. If use is low, we may manage those approximately six acres in another habitat type, such as grassland, shrubland or forest, to promote wildlife habitat quality and diversity and public view opportunities.

5. We plan to expand the amount of refuge shoreline and tidal marsh protection to include an area increasingly at risk. We have added another 3,000 linear feet along the northern boundary of the refuge. In the Draft CCP/EA we focused our discussion on expanding our protection effort along the southern and southwestern refuge boundary, with priority on protecting Hail Point Cove. While the Hail Point project will continue to be the highest priority of us, we now include the northern boundary of the refuge, including Tubby Cove, as another priority area. Over the past few years, the shoreline erosion and tidal marsh losses in this area have become more apparent. It is important to note, however, that all major shoreline protection and restoration projects will require additional environmental analysis and public involvement. Coupled with this effort, we plan to re-evaluate our intensive *Phragmites* control efforts in areas where the shoreline is actively eroding. While we do not prefer to retain an invasive exotic species, such as *Phragmites,* this plant's deep root system anchors the plant well and helps buffer the shoreline from the erosive effects of wind or high wave action. In some areas, if we continue to remove *Phragmites* without having established native emergent vegetation or some other buffer, than open water may result with no protection for the shoreline. In summary, retaining *Phragmites* along certain sections of the refuge's actively eroding shoreline may be the best option in the near-term for protecting that shoreline until more permanent measures are in place to stabilize and sustain native marsh development.

Our Regional Director will either select: our modified Alternative B for implementation; one of the other two alternatives analyzed in the Draft CCP/EA; or, a combination of actions from among the three alternatives. He will also determine whether a Finding of No Significant Impact (FONSI) is justified prior to finalizing his decision. He will make his decision after:

- Reviewing all the comments received on the Draft CCP/EA, and our responses to those comments; and,

- Affirming that the CCP actions support the purpose and need for the CCP, the purposes for which the refuge was established, help fulfill the mission of the Refuge System, comply with all legal and policy mandates, and work best toward achieving the refuge's vision and goals.

Concurrent with release of the CCP, we are publishing a notice of its availability in the *Federal Register*. That notice will complete the planning phase of the CCP process, and we can begin its implementation phase.

Summary of Comments Received

During the comment period, we received 42 responses, both written and oral. We also gathered oral comments at afternoon and evening public meeting sessions held on September 24, 2009 at the Rock Hall Municipal Building in Rock Hall, Maryland. The sessions were attended by 17 people.

We received comments from the following federal, state and local agencies:

- U.S. Army Corps of Engineers, Baltimore District
- Wildlife and Heritage Service – Maryland Department of Natural Resources
- Farm Bill Coordinator – Maryland Department of Natural Resources
- Maryland Historical Trust – Maryland Department of Planning

We also received comments from these organizations:

- Ducks Unlimited
- Friends of Eastern Neck, Inc.
- Defenders of Wildlife
- Maryland Waterfowler's Association

In the discussions below, we address each substantive comment received. Directly beneath each subject heading, you will see a list of unique letter ID numbers that correspond to the person, agency or organization that submitted the comment. The cross-referenced list appears as attachment 1 to this appendix.

In several instances, we refer to specific text in the Draft CCP/EA, and indicate how the CCP was changed in response to comments. You have several options for obtaining the full version of either the Draft CCP/EA or the CCP. They are available online at *http://www.fws.gov/northeast/planning/Eastern%20Neck/ccphome.html.* For a CD-ROM or a print copy, contact the refuge headquarters.

Eastern Neck National Wildlife Refuge
1730 Eastern Neck Road
Rock Hall, MD 21661
Phone: 410-639-7056
Fax: 410-639-2516
Email: easternneck@fws.gov

Service Responses to Comments by Subject

Planning Process and Policy

Document Clarity
(Letter ID#: 3, 4, 5, 25, 26, 37, 38)

Comment: Three respondents comment on an omission in our September 2009 CCP update newsletter. They expressed concern that we did not mention our current hunting, fishing and crabbing activities as being part of our description of Alternative B. Several respondents were confused if this meant that we were reducing or eliminating those programs.

Response: We apologize for the confusion and agree we could have been clearer in our newsletter's description of Alternative B. However, the Draft CCP/EA and the final CCP both make clear that we are maintaining the current recreational fishing and crabbing program (Re: Chapter 3, Alternative B, Goal 3, Objective 3.3.1), as well as the deer and youth turkey hunting program (Re: Chapter 3, Alternative B, Goal 3, Objectives 3.3.2 & 3.3.3).

Comment: Four respondents comment on corrections or additions needed in the text of the Draft CCP/EA. One mentioned that the green tree reservoir (GTR) deep well and turbine pump has never been used, contrary to what we said in the narrative. This same person requests we include the Easton Waterfowl Festival as a partner since their funding, provided through Ducks Unlimited, has supported refuge projects such as the construction of moist soil unit (MSUs) and Hail Point Cove restoration.

Response: In the Draft CCP/EA, Chapter 3, Alternative B, Goal 1, Objective 1.2.3 (Green Tree Reservoirs for Waterfowl), we state, "GTR #2 does have a pump attached to a deep well on the refuge. However, refuge staff have determined the use of this pump is not worth the time, effort, and cost of fuel to fill the reservoir unless an emergency situation exists. This has been a rare situation—it has only operated once in the last seven years." We continue to believe this is an accurate statement based on our conversation with past and present refuge staff. With regards to including the Easton Waterfowl Festival as a partner, we are happy to acknowledge their valuable assistance and regret that omission in the Draft CCP/EA. They are listed along with our other important partners in Chapters 1, 3 and 4.

Comment: Two commenters request that we include more information about a time schedule and a priority for implementing projects. The Defenders of Wildlife also suggests that "…the final CCP should describe the specific indicators that will be monitored, explain the reasons for selecting these indicators that will be monitored, explain the reason for selecting these indicators, and tie monitoring information to management actions. The step-down plans can then describe strategies for how to monitor these indicators."

Response: We appreciate the interest in seeing this level of detailed planning in the CCP, but we simply can not provide that level of commitment over the next 15 years given our budgeting process. As we state on the inside cover of the Draft CCP/EA, CCPs "…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." In the Draft CCP/EA, Chapter 3, under "Developing Refuge Step-Down Plans", we list the refuge plans that will be a priority to complete. Three plans in particular, the Habitat Management Plan, the Annual Habitat Work Plan, and the Inventory and Monitoring Plan will provide many of the details of interest identified in the comments. We include a description of each of these step-down plans in Chapter 3, including the important information they will contain to prioritize, implement and monitor our management activities.

With regards to prioritizing projects, there are other places in the Draft CCP/EA where we indicate our priorities for refuge activities. In Chapter 3, Alternative B, Goal 1, Subgoal 1 rationale, we state "Actions to protect those areas [the refuge shoreline and near-shore environment] on and near the refuge, in particular, the eroding shoreline and tidal marshes, are the highest priority to implement on the refuge under this alternative. Our proposals under Objectives 1.1.1 and 1.1.2 were developed with that priority in mind." In addition, the Draft CCP/EA Appendix C includes refuge projects currently in the Refuge Operations Needs (RONS) and the Service Asset Maintenance Management System (SAMMS) databases. These are priority projects to be completed as soon as funding permits. We would also like to point out that we endeavor to give a sense of timing and priority by listing strategies for each objective statement under the headings, "*Continue to*" or "*Begin within* 3 (or 5 or 10) *years*.

With respect to the comment that we should plan future management actions based on what we learn from monitoring, we wholeheartedly agree. Our adaptive management approach for improving resource management decisions is described in the Draft CCP/EA, in Chapter 3, under "Adaptive Management". A major basis of this management approach is to monitor management actions and outcomes, and key resources, and make adjustments in our activities if we are not meeting our objectives or producing the desired results.

Refuge Establishment Purpose
(Letter ID#:3, 4, 5, 6, 17, 18, 20, 21, 22, 29))

Comment: Numerous commenters, including the Maryland Waterfowler's Association, recommend that the CCP more strongly "…reflect the main and original purpose of the refuge which is to protect and conserve wintering migratory waterfowl and birds." Some of the respondents believe that the refuge has yet to meet its potential as a refuge for waterfowl and would prefer it excel at this then trying to diversify its goals. One commenter suggests that by not having the conservation of wintering waterfowl as a specific goal, its emphasis is "…diminished or muted".

Response: The Service maintains a database of all the official establishment purposes for refuges in the National Wildlife Refuge System at *http://refugedata.fws.gov/databases/purposes.taf?function=form*. In the Draft CCP/EA Chapter 1, page 1-24 we identify that official purpose for Eastern Neck Refuge, which was stipulated by an executive order in December 1962, as "…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." We go on to say on page 1-24 more specifically, however, that "…By virtue of its strategic location at the

confluence of the Chester River and the Bay, it is of significant value to migrating and wintering waterfowl on Maryland's Upper Eastern Shore."

The "goal-subgoal-objective" organization of our management activities presented in the Draft CCP/EA, Chapter 3 is modeled after the Chesapeake Marshlands Refuge Complex CCP. Their Goal 1 is also a broad statement about conserving Federal trust resources and other species and habitats of special concern in the region. We believe it is important to be as consistent as possible between the two plans given that Eastern Neck Refuge is part of that Refuge Complex. We disagree with the comments that this structure "diminishes or mutes" our management emphasis on waterfowl.

We would also like to point out some of the numerous places that conserving waterfowl is listed as one of our highest priorities. First, in the Draft CCP/EA, Chapter 3, our Service-preferred Alternative B is titled, "Emphasis on Tidal Wetlands and Waterfowl." On page 3-39 of the draft plan, in the introduction to Alternative B we say, "…Its primary focus is active management to protect and restore the refuge shoreline and tidal marsh habitats, and enhance upland habitats for wintering waterfowl and other migratory birds." Goal 1, Subgoal 2, is specifically about sustaining wintering populations of waterfowl and has more objectives identified than any other subgoal in the plan.

Statutory Authority/Jurisdiction
(Letter ID#: 8)

Comment: The Army Corps of Engineers (ACOE) comment that proposed breakwater projects and the marsh restoration program may be subject to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. They also request that we have these waterbodies identified and delineated by an environmental consultant and make sure to secure all the proper permits for these projects. They enclose a checklist to aid us in compliance.

Response: We will adhere to all requirements for obtaining authorizations or permits and protecting jurisdictional wetlands required for national wildlife refuges. We take seriously our responsibility to comply with both the Clean Water and the Rivers and Harbors Acts. As we stated in the Draft CCP/EA, Chapter 3, under "Additional NEPA Analysis", the proposed new shoreline protection or breakwater projects are actions that would require additional environmental analysis and partner and public involvement once a lead-agency and site-specific proposals are developed.

Alternatives

Alternative B
(Letter ID#: 2, 6, 11, 12, 13, 15, 16, 19, 23, 38)

Comment: Twelve respondents support our Service-preferred Alternative B. Specific reasons they cite include: the emphasis on habitat management with appropriate mix of cropland and forest habitat to support migratory birds; the importance of protecting migratory wildlife, the need for

a full-time biologist to assist in the control of invasive species and answering visitor questions, the protection of threatened and endangered species and regionally concentrated wildlife, and the appropriate protection and treatment of the Refuge's cultural resources.

Response: We appreciate the support of our preferred alternative. All of the actions mentioned by respondents are included in our modified Alternative B, represented by the final CCP, which we are recommending to our Regional Director for implementation.

New Alternatives Proposed by Respondents
(Letter ID: # 7)

Comment: One commenter proposed a new Alternative "D." The central premise of this person's proposal is the de-complexing of Eastern Neck Refuge from the Chesapeake Marshlands Refuge Complex and "…adopting a dynamic, citizen-centered approach for its future management." The commenter would like the Service to return Eastern Neck to a stand-alone refuge by fiscal year (FY) 2013 because they believe the public was not involved in the decision to complex the refuge. The proposed Alternative "D" includes nine objectives, which we summarize below:

1. Engage the public in determining management priorities and designing strategies for achieving the Refuge's purposes…use "strategic scenario planning" with conservation partners, college students, elected officials, local residents and other stakeholders.

2. Redesign refuge job descriptions to create dual-function staff and reinstate employees "displaced" by refuge complexing.

3. Develop a "collaborative science network" of field specialists stationed at individual refuges and FWS offices.

4. Implement "…21st Century management strategies including…systems thinking" to achieve significant advances through small, focused actions.

5. Model "environmental stewardship" through public demonstrations of energy conservation, renewable energy generation (wind and solar), native landscaping, and other land ethics

6. Pursue "partnerships and grant funding" to help accomplish citizen-science biodiversity inventorying, climate stewardship, habitat and shoreline restoration, wildlife populations monitoring, invasive species control, archeological research, historical interpretation, ecotourism events, and all "Big 6" public uses.

7. Recruit new volunteers from less represented communities (e.g., minorities, people with disabilities) and re-establish the refuge's "resident volunteer program" to accommodate RV work-campers and conservation partners from distances.

8. Measure "economic sustainability" of Eastern Neck's operating expenses and accomplishments and the refuge's impacts on the community's economic stimulus through ecotourism.

9. Invite "political oversight" and site visits by members of the DOI, DOE, and USDA Secretariat; the Senate Committee on Environment and Public Works; and the House Resources Committee.

Response: The decision to complex Eastern Neck Refuge with the Chesapeake Marshlands Refuge Complex is an administrative one and well within the authority of the Service to make without public involvement. Personnel actions are categorically excluded from preparation of EAs or environmental impact statements (43 CFR, Part 46, Subpart C, §46.210). The decision to complex the refuge was part of a larger Regional National Wildlife Refuge System (Refuge System) downsizing and base budgeting plan, implemented in 2006 and approved by the Regional Director. It was developed in response to the Refuge System's current and forecasted budgets, predicted to be either level or declining, coupled with the fact that salaries and other increasing costs were eroding the management capability at field stations. Objectives #2 and #3 above make recommendations about refuge staff positions and respective locations; decisions that were part of the 2006 plan.

We believe Alternative B of the Draft CCP/EA already includes aspects of several of the remaining objectives identified above. With regards to objective #1, the Draft CCP/EA, Chapter 5, includes our coordination and consultation with others during the planning process. We held public meetings, published *Federal Register* Notices, distributed newsletters and media releases, maintained a website, gave presentations at invitational meetings, and held a technical workshop—all with the intent to solicit input on current or proposed refuge management. We maintain a project mailing list of approximately 1,000 individuals, state, federal and county agencies, organizations, and corporations. We alerted everyone on our mailing list to the availability of the Draft CCP/EA for public comment, and gave everyone 52 days to respond or contact us with questions or concerns. As we describe in this appendix, public comments affected change in our proposals. In our best professional judgment, we believe the CCP combines actions that will best achieves the purposes, goals, and vision of the refuge, contribute to the mission of the Refuge System and the Service, address issues, and incorporate sound principles of fish and wildlife conservation.

Regarding the suggestion to engage the public and partners in setting priorities, the CCP process included many opportunities to review and comment on management actions and priorities. We also wish to point out there are many places in the document that we mention the importance of coordinating with our partners and other resource experts, and the value of engaging the public. The CCP, once final, provides the strategic framework to enhance our relationships with the public and our partners, and a basis for communicating and refining priorities. This is especially important as we move to the implementation phase. We emphasize in Chapter 1 of the Draft CCP/EA and again in Chapter 3, that actions proposed under our biological goals take precedence and that our highest priority over the next 15 years is to work with experts to help us plan, design, and implement measures to protect the refuge's shoreline and tidal marsh habitat. Very few comments we received suggested a different priority.

Objective #4, if we understand the comment accurately, suggests that we should implement "small, focused actions" that contribute to a larger landscape conservation purpose, and that we should also include outside expertise in developing, implementing and evaluating those actions. We agree

and believe our draft and final plans do just that. In Chapter 1 of the Draft CCP/EA we describe all of the international, ecoregional, regional and state conservation plans we consulted. In many instances we talked to the authors, or responsible officials, to assess what role the refuge could play in implementing the goals of each plan. In Chapter 2, we describe the refuge's international and national context and its importance in the region. In Chapter 3, listed as strategies under most of the objectives, we indicate our intent to work with, and expand, our partnerships.

Pursuing renewable and alternative energy sources, mentioned in Objective # 5, is a major focus for us. We describe in the Draft CCP/EA, in Chapter 2 under "Refuge Management Facilities" what we have in place. In Chapter 3, under "Refuge Staffing and Administration" we describe our plans to service, repair, and maintain existing renewable energy sources, namely the windmill and the solar panels, and to look for other opportunities as we replace equipment and facilities. Under Alternative B, Goal 3, Objective 3.4.3 (Demonstration Areas), we describe our interest in promoting the refuge as a demonstration and learning site for such programs as renewable energy, BayScaping, best management farming and forestry practices, and tidal marsh restoration.

Objective #6, regarding pursing partnerships and grants, is a significant emphasis in the Draft CCP/EA which we feel is sufficiently covered. We mention the significant role that our partners play, and will continue to play in virtually all of our refuge programs. In Chapter 2 of the Draft CCP/EA, under "Eastern Neck Partners" we list some of our key partners and explain how they are "…integral to managing, monitoring, and evaluating the projects and programs we undertake." In Chapter 3, listed as strategies under most of the objectives, we indicate our intent to work with, and expand, our partnerships. Objective 2.1.2 (Research Partnerships), specifically mentions our interest in pursuing partners to conduct research to enhance our ability to achieve our goals and objective and to monitor the effectiveness of our actions. Objective 3.1.2 (Other Agencies and Partner Outreach) details our interest in fostering and enhancing "…cooperation and communication with other state and Federal agencies, museums, civic organizations, environmental and conservation groups to promote and advance the Refuge System mission and refuge goals."

The recommendation under objective #7 to increase recruitment of volunteers is one we have addressed in the Draft CCP/EA, although we did not stipulate a focus on recruiting "less-represented communities." In Chapter 2, under "Volunteer Program" we describe the importance of our current program. In Chapter 3, under Alternative B, Goal 3, Objective 3.5.2 (Volunteer Program), we describe how we will continue an active program with improved coordination from our staff. Under Objective 3.1.1 (Community Outreach), we discuss our plans to conduct more effective outreach within Kent County to pursue our interest in raising awareness of the Refuge System mission and the refuge's vision and goals, and to encourage participation in our volunteer program.

Objective #9 involves a recommendation to invite agency and elected officials to the refuge to review and assess activities. We welcome the attention of agency and elected officials because we are proud of our accomplishments. Our September 2009 Hail Point Cove event was a great opportunity to showcase to officials the tidal marsh and shoreline protection project that was implemented with major support from partners. We maintain close communications with Congressional officials and their staff. We provide regular briefings to those offices and to other

state and federal agency officials with jurisdiction or management authority in the vicinity of the refuge. Those briefings may be in the form of sharing annual accomplishment reports, written and in-person briefings focused on a particular issue or topic, field and site visits, or visits to Congressional state offices or their offices on Capitol Hill. At every opportunity, we remind officials of our open invitation to tour the refuge and discuss our management.

Refuge Physical, Natural and Biological Resources

Shoreline Protection
(Letter ID#: 2, 9, 42)

Comment: There were three comments supporting the shoreline protection proposed in Alternative B; two of those people specifically mention their support of using off-shore breakwaters for that protection. One person further suggests the "…use of reef balls and oyster beds in concert with the breakwaters and any new breakwaters should be placed closer to fast land to ensure the accretion of wetlands development behind them," and, "…if additional spoils are needed, dredge the Eastern Neck Island Channel."

One individual recommends keeping *Phragmites* in place to prevent further erosion.

Response: We appreciate the support for the shoreline protection we proposed in the Draft CCP/EA. We also appreciate the sharing of ideas for implementing protection measures. However, as we mentioned above under "Statutory Authority/Jurisdiction", at this time, we have only identified priority areas in need of protection and have not fully developed a specific project. Any new breakwater projects are major actions that would require additional environmental analysis and partner and public involvement once a lead-agency and site-specific proposals are developed. Details on the most appropriate, efficient, and effective techniques, within the parameters allowed by required permits and regulations, would be vetted through that process. In the meantime, we are monitoring the recent work in Hail Point Cove to evaluate the techniques used in that shoreline and marsh restoration project.

We agree that retaining *Phragmites* along certain sections of the refuge's actively eroding shoreline may be the best option in the near term for protecting that shoreline until more permanent measures are in place to stabilize and sustain native marsh development. We mention this above in our list of important changes to the final plan (see item #5 in the list of changes to the final plan above). We also include this as a strategy in Chapter 4, Goal 1, Objective 1.1.1 (Shoreline Protection).

Historic and Cultural Resources

(Letter ID#:16)

Comment: The Maryland Historical Trust provides their review of the Draft CCP/EA with particular focus on those sections of the CCP that deal with the Refuge's historical and cultural resources. They cite their full support for the goals, objectives and specific actions in the CCP we list as ways to protect and enhance historic and cultural resources. They mention looking

forward to working with us "…to ensure the appropriate stewardship of cultural resources in the implementation of the CCP for Eastern Neck NWR and address relevant responsibilities under Sections 106 and 110 of the National Historic Preservation Act of 1966."

Response: We take seriously our responsibility to protect historic and cultural resources. All of the actions mentioned by the Maryland Historical Trust are included in Chapter 4 as "General Refuge Management–Protecting Cultural Resources", or as subgoals, objectives, or strategies under the following headings: Goal 1, Subgoal 5, Objective 1.5.1 (Archeological Resource Protection); and, Goal 1, Subgoal 5, Objective 1.5.2 (Protection of Historical Structures).

The Maryland Historical Trust letter is included as Appendix G to document our consultation under Section 106 and 110 of the National Historic Preservation Act of 1966. We will continue to consult with this agency as we implement specific projects.

Cropland Management for Waterfowl
(Letter ID#: 2, 3, 4, 5, 6, 9, 12, 17, 18, 20, 21, 22, 26, 29, 38, 39, 40, 41)

Comment: There are 18 respondents who commented on the proposed reductions in croplands and the plans to convert those acres to forest habitat. Those opposed do not support cropland reductions because the overall amount of forage for wintering and migratory waterfowl would be less during the winter months when the birds are most stressed. Specific concerns expressed include mention that with cropland reduction there "…will not be a sustainable amount of residual feed to sustain them [waterfowl] through the winter", and because the resulting fewer fields "… will reduce the amount of space available for waterfowl to remain undisturbed, particularly AP Canada geese." One person took issue with our suggestion that the negative impacts to waterfowl of reducing cropland acres may be offset by consolidating the remaining crop fields into larger tracts. Another person wanted the amount and configuration of cropland to remain as is, but suggest we try diversifying the crops to include winter wheat and alfalfa.

One commenter will support cropland reduction with the stipulation that the remaining fields have an increase in unharvested crops left to offset the loss in acres and continue to support the same number of wintering and migratory waterfowl. Another commenter supports cropland reduction stating that waterfowl historically used refuge lands before cropland farming existed, so managing for more natural habitats does not necessarily exclude waterfowl. The Defenders of Wildlife appreciate the need for maintaining some cropland for food and habitat for migratory and wintering waterfowl, particularly in light of declines in submerged aquatic vegetation. However, their organization supports the overall reduction in cropland acres because fewer crop fields are more consistent with Service policy on maintaining and restoring biological integrity, diversity, and environmental health on refuge lands.

Response: In our best professional judgment, we believe our modified Alternative B cropland management is the most reasonable and efficient approach to maintaining quality wintering and migrating waterfowl habitat (see #2 in the list of changes to the final plan above). We are retaining the most productive fields and the ones with the highest use by ducks and Canada geese and in a configuration that affords them security cover. We will continue to work with the cooperative farmer to implement an adaptive management approach which is responsive to current conditions,

such as weather, but still allows us to meet the priority objectives for waterfowl. Goal 1, Objective 1.2.1 (Cropland Management for Waterfowl), details our cropland management strategies.

Comment: Other comments relate to concerns with farming practices. One respondent expresses concern with the use of nitrogen fertilizer due to the detrimental environmental impacts it poses to water quality in the Chesapeake Bay. This person recommends the use of nitrogen-fixing cover crops as a better management practice and as an alternative food source for wildlife. He suggests the establishment of good agricultural practices for soil management including minimizing chemical fertilizers and pesticides, establishment of buffer zones, controlling runoff and non-point pollution. The Friends of Eastern Neck support farmers and farming but suggest that the Service "…adopt practices that minimize chemical fertilizers and pesticides and maximize organic fertilizers, establish buffer zones, control runoff, control non-point pollution, etc…" and "…use the refuge as a teachable example of best farming practices."

Response: Implementing sustainable, best management farming practices is a major emphasis in our cropland program. In the Draft CCP/EA, Chapter 3, under Alternative B, Goal 1, the strategies for Objective 1.2.1 (Cropland Management for Waterfowl), details what practices we plan to employ to prevent sediment, chemical, and nutrient runoff in to the Chesapeake Bay. In response to the particular concern about nitrogen-loading, we specifically plan to work with the cooperative farmer to increase the amount of clover and other nitrogen fixing cover crops to minimize the need for chemical fertilizers. Soil testing is done each year prior to planting to determine whether additional nitrogen is even needed, or to insure that only the minimum amount is applied to be effective.

Hedgerows
(Letter ID#: 2, 4, 5, 6, 9, 17, 18, 20, 21, 22, 29, 40, 41, 42)

Comment: Six respondents recommend not removing hedgerows. Their reasons that hedgerows are beneficial include: they provide important songbird habitat and habitat for other diverse wildlife species, prevent wind erosion from croplands, attract dabbling ducks and other shorebirds, and provide security cover and travel corridors for small animals and birds. One person understood our basic rationale for removing hedgerows, but suggested we be pragmatic about where and how much we convert since, "…maintaining a transition between field and forest is expensive (i.e. Geo-boy use, spraying, mowing, etc). Another person expressed concern that hedgerow removal may attract snow geese, which are not desirable. Another expresses concern that with the loss of hedgerows, "…a whole biome that utilizes the hedgerows and edge habitat presented by the field arrangement…" would be impacted and, "…much of this has already been lost over the last 40 years off refuge as the local farmers switched from mixed grain/dairy farming to primarily small grain farming with fewer, larger fields."

Several people support hedgerow removal, although some qualify their support in only removing the "small" hedgerows, because they believe it would make field maintenance more efficient, the hedgerows are only marginal wildlife habitat, and because the resulting increased field sizes would hold more waterfowl.

Response: In response to public comment, our staff conducted a field review of the hedgerows we identified for removal in Alternative B of the Draft CCP/EA. We also made another site visit with a MD DNR waterfowl expert to obtain his opinion. Our intent was to further evaluate each hedgerow's length and depth as a measure of their real effectiveness in providing security cover and travel corridors for small animals and birds, and to determine the extent of invasive and exotic plant establishment as a measure of their impact on biological diversity and integrity. As a result of our evaluations, we determined there are several reasons to keep two of the hedgerows in place (see item #3 in the list of changes to the final plan above). First, these hedgerows, which are near refuge headquarters, would help protect soils from wind and storm events in the refuge's largest crop field. Second, they are wide enough and have minimal invasive plants present such that they contribute to wildlife habitat diversity. Third, they lie along a main public access road where they facilitate public viewing opportunities. In addition, we will enhance these forested strips as needed, for example planting young trees and/or treating invasive plants, in order to sustain them as quality wildlife habitat.

Wetlands (Natural and Managed)
(Letter ID#: 2, 3, 4, 5, 9, 17, 18, 20, 21, 22, 14, 41, 42)

Comment: Several respondents support the protection and expansion of tidal marsh restoration, but would like us to restore more than the 108 acres planned in the Draft CCP/EA.

Response: We agree that we should have thought more broadly in the Draft CCP/EA and have included in our final CCP a discussion on the protection and restoration of an additional 3,000 linear feet of the refuge's north shoreline. Undoubtedly, this will involve additional marsh restoration, but detailed plans have not been developed yet. As we note above, in our list of changes made between draft and final plans (see item 5 in our list of changes to the final plan above), all major shoreline protection and restoration projects will require additional environmental analysis and public involvement. This additional project is also discussed in the final CCP in Chapter 4, under Goal 1, Subgoal 1, Objective 1.1.1 (Shoreline Protection).

Comment: Several commenters suggest we need to improve our management and maintenance of the existing moist soil units (MSUs), including the installation of efficient water control structures. Four commenters support the 22-acre increase of MSUs, while other supporters indicate a general interest in seeing more emergent wetlands to benefit more diverse waterfowl, including puddle ducks, as well as shorebirds and wading birds. One person specifically requests an increase of emergent wetlands from the planned total 50 acres to 100-125 acres for more for year-round photo and recreational opportunities for migratory waterfowl and songbirds.

Response: We support the need to annually maintain, repair or replace water control structures in MSUs to the extent needed to support our management objectives. These are described in the Draft CCP/EA, Chapter 3, under Alternative B, Goal 1, Objective 1.2.2 (Moist Soil Units for Waterfowl and Other Birds). With regards to the recommendation that we at least double the acres in MSUs, we simply disagree. In our best professional judgment, our final plan includes an expansion of MSUs that is the best and most realistic program to implement over the next 15 years, given our other habitat priorities. Additionally, our recent field review of potential moist

soil units indicates that the island's soils and topography does not lend itself to the construction of extensive MSU complexes. The slope of the island would increase the cost of construction and maintenance, and likely result in numerous small inefficient units and much more expensive on a cost/acre basis to maintain. We believe it is most important to evaluate, and if needed, improve upon the structures we have in place, while implementing a modest expansion, to insure we are developing the most effective and efficient designs. If our monitoring over the next 15 years indicates a high resource value, a further expansion of MSUs could be evaluated during development of the next CCP.

Comment: Five commenters recommend upgrading or repairing the Green Tree Reservoirs (GTRs). One person requests we analyze soil types to determine the holding capacity of water to make sure the GTRs are located properly. Several requests are made to replace non-functioning water control structures and restore to working order the deep well and pump at GTR #2.

Response: We agree that we need to evaluate the condition and function of our GTRs and indicate this in the Draft CCP/EA, Chapter 3, Alternative B, Goal 1, Subgoal 2, Objective 1.2.3 (Green Tree Reservoirs for Waterfowl). We describe in the "basis for the objective" and in the strategies that we need to do a thorough evaluation of each GTR to determine whether the level of waterfowl use merits the investment of staff and operations and maintenance funds, and/or whether to make improvements in infrastructure, and/or whether to continue the rotational management currently used. We make specific mention that the evaluation will include a decision on what to do with the pump in GTR #2. Our plans are to conduct this evaluation within 5 years of CCP approval.

Forest Management
(Letter ID#: 3, 4, 5, 6, 15, 17, 18, 20, 21, 22)

Comment: We discuss above under "Cropland Management" why some respondents are concerned with the loss in waterfowl habitat quality if some croplands are converted to forest. However, respondents expressed additional concerns with converting fields to forest. These include the chance for increased opportunity for invasive and exotic plants species to spread, the desire not to attract raptors, and the loss of wildlife viewing opportunities in the fields.

Other people support an increase in forest habitat. One person notes, "…riparian forested buffers are extremely important to the future restoration of the Bay. Consolidation of the farm fields in consideration of their juxtaposition to forest lands and expanded forest buffers provide important water quality and wildlife benefits supportive of the Service's trust resources and the Bay's future."

Response: Our respective discussions above under "Cropland Management" and "Hedgerows" directly relate to this response on forest management. As we state above, we are using our best professional judgment to determine the best mix of habitat types, patch size, and distribution on refuge lands to meet our goals and objectives. In response to public comment and additional field reviews, we have made some changes in the final plan, but none of those changes result in a loss of existing forest habitat, nor do they result in further fragmentation of the forest. We will remain vigilant to any possibility of spreading invasive and exotic plants as their control is a high priority

on the refuge. Regarding the concern that forest land attracts raptors, we must argue this is a benefit. Migratory birds, including raptors, are Federal trust resources and their protection and conservation is one of our agency's primary responsibilities. A raptor of particular importance to us on Eastern Neck refuge is bald eagles. Draft CCP/EA, Chapter 3, Alternative B, Goal 1, Subgoal 3, Objective 1.3.3 (Bald Eagle Conservation), outlines our strategies to protect them.

We agree fully with the comment on the benefits that riparian buffers provide, which is why we include a strategy in the Draft CCP/EA, Chapter 3, Alternative B, Goal 1, Subgoal 3, Objective 1.3.1 (Forest Habitat Management), that a minimum 330 foot forested buffer be established around the refuge's shoreline and tidal marshes "…to promote riparian habitat for forested birds, bald eagles and other raptors, and other wildlife and to provide other resource values such as for water quality and marsh protection."

BayScape Garden
(Letter ID#: 24, 42)

Comment: There were two comments that favor maintaining the Bayscape Garden. One commentator corrects our CCP/EA BayScape garden description in chapter 2 and states that irrigation and fertilization are no longer used. Another respondent feels that the BayScape garden is a very valuable asset to be maintained on the refuge as it attracts many visitors who enjoy viewing and photographing insects in the garden. The respondent feels that the garden "… contribute[s] to many sub goals and strategies for photography, environmental education and interpretation…" in our Draft CCP/EA. This person also comments on the important partnership between the refuge, the Friends of Eastern Neck, and the Maryland Master Gardeners in maintaining the garden. They mention that this partnership could be strengthened and communication could be improved to "…prevent duplication of efforts." Specific projects suggested for collaboration include an informational kiosk, educational programs, and a butterfly and plant brochure.

Response: The Draft CCP/EA specifically mentions the outreach, educational and wildlife observation values the BayScape garden provides, and the significant role that partners and volunteers have played. In the Draft CCP/EA, under Alternative B, Goal 1, Objective 1.3.2 (Grassland Habitat Management), and under Goal 3, Objective 3.43 Demonstration Areas, we list strategies for maintaining the BayScape Garden with partners and volunteers and promoting its use as a demonstration and education site.

Invasive and Exotic Plant Species
(Letter ID#: 5, 39)

Comment: Two respondents comment on invasive species management on the refuge. One respondent questions our classification of autumn olive as an invasive species, and thus our removal of it from the refuge. The respondent points out that it provides a food source for many birds. Another respondent states that two ponds on the refuge are in immediate need of *Phragmites* control.

Response: Autumn olive (*Elaeagnus umbellata*) is classified as an invasive plant in the state of Maryland. The Maryland DNR maintains a list of invasive and exotic species on their website at http://www.mdinvasivesp.org/invasive_species_md.html. They classify autumn olive as a "code 2" species, which is defined as "[w]idely recognized by biologists and natural resource managers to degrade natural resources and/or negatively impact native species." Although autumn olive does provide some benefits to bird species, there are many native plant species that are more beneficial and do not decrease biodiversity by dominating other vegetation.

With regard to suggested priority areas for *Phragmites* and other invasive, exotic plant treatments, we offer the following explanation of our current program. In the Draft CCP/EA, in Chapter 2 under "Invasive Species", we identify the four plants that we focus most of our attention and resources on: *Phragmites,* mile-a-minute, Johnsongrass, and Canada thistle. In order to control *Phragmites*, we have partitioned the refuge into treatment blocks. We are working from the north block to the south block in a rotation over the course of several years. In a given year, we will first re-treat areas that were treated the previous year, if needed, in an attempt not to lose ground. Once last year's areas are treated, we move to the next block south, or start over again on the north end. We agree with the respondent that the two ponds mentions are high priority because they have historically provided high quality habitat. We recently treated one of the ponds in September 2009, and plan to treat the other one in 2010.

For more information on why we control for invasive plants and our treatment methods, please refer to Chapter 3 in the Draft CCP/EA, Chapter 3, under Actions Common to All Alternatives—Invasive Plant Management.

Global Climate Change

General
(Letter ID#: 38)

Comment: Defenders of Wildlife support our efforts to address global climate change impacts in our Draft CCP/EA because they believe that it is one of the "…most significant problems affecting plants and animals today."

Response: We are very concerned about the predicted impacts from global climate change on wildlife and other natural resources. While there is much uncertainty about the scope, scale, and timing of those impacts, we are trying on a local level to do what we can to minimize those threats. We identify some of those actions in the Draft CCP/EA, Chapter 4, in the section on "Cumulative Effects—Climate Change. Fortunately for us, the Department of Interior and its agencies are in the forefront of developing guidance for land managers on addressing climate change. We will stay informed as recommendations develop and we will implement those measures within our capabilities.

Refuge Administration

Staffing
(Letter ID#: 6, 42)

Comment: Two respondents comment on refuge staffing. The first suggests that it might be beneficial if the manager or maintenance person also has law enforcement capabilities. The other strongly supports the proposed addition of a biological technician to aid refuge biological programs and help answer refuge visitor questions. This commenter also feels that we do not need to add any law enforcement personnel on the refuge because local, Kent County Sheriff and existing Refuge Complex law enforcement officers already do an adequate job protecting the refuge.

Response: In the Draft CCP/EA, Chapter 3, Alternative B, we identify staff positions we recommend to support full implementation of our goals and objectives and explain our reasoning in respective strategies. Appendix D also presents a staffing chart that reflects our recommendations. Current and new positions will maintain and enhance our visitor services and biological programs, and protect our most important resources. The law enforcement position we recommend would serve not only Eastern Neck Refuge, but will facilitate law enforcement and outreach efforts at Susquehanna Refuge and on Garrett Island, which is part of Blackwater Refuge. In addition, we acknowledge the great partnership we have with Kent County Sheriff's Office, who is regularly assisting us with security patrols. However, the Sheriff's Office is not able to enforce the full scope of refuge laws and regulations. We need additional capability to enforce refuge regulations including those regarding hunting, shoreline trespass, archeological law enforcement and other refuge regulations.

Public Use and Access

Hunting
(Letter ID#: 10, 25, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 43)

Comment: Twelve respondents comment on the refuge hunting program. Eleven people express support for the refuge's hunting program for reasons including its use as a wildlife management tool, its support of wildlife conservation, and because of the recreational opportunities it provides. One person supports having designated hunting areas to help prevent accidental shootings. A few respondents suggest we consider expanding hunting opportunities.

One respondent opposes hunting because of a concern with the safety of others using refuge lands, and the fact that providing a hunting opportunity on public lands is "…not representing the majority of Americans…" and is instead representing, "… an extremely small group."

Response: Hunting is a priority public use within the National Wildlife Refuge System as established in the National Wildlife Refuge Administration Act of 1996 (16 U.S.C. 668-dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Pub. L. 105-57; 111 Stat. 1253). We describe our current deer and turkey hunt program in the Draft CCP/

EA in Chapter 2. It is popular with the public and we receive positive feedback each year from participating hunters. Our description in Chapter 2 includes a map depicting what areas are open to hunting and which are closed as part of a "Safety" or "No Hunt" zone. Refuge lands are closed to other visitors during hunting, although vehicular access is allowed through the refuge to Bogles Wharf boat landing. Safety concerns are our highest priority and the hunt is designed with this in mind.

In Chapter 3, Alternative B, under Goal 3, Subgoal 3, Objective 3.3.2 (Deer Hunting), we provide additional rationale for providing this hunt, including that it is designed, in large part, "… to maintain the deer population on the island at a level commensurate with available habitat, in order to maintain the health of the herd and prevent habitat degradation that accompanies overpopulation." Approximately 80-100 deer are removed each year. We also point out that "…the extent of our current program meets the needs of our public and provides a quality experience. However, we will continue to evaluate the program on an annual basis and modify it, as warranted, given new biological or visitor data."

With regard to expanding our hunt program, we believe we are offering a quality hunting program given: the land base we have and the other activities we are trying to accommodate; the resources we have available to implement the program and expect to have available in the foreseeable future; and in the case of deer, the herd maintenance objective we have set. We will re-evaluate an expansion to our hunt program in 15 years with the next CCP, unless significant new information or conditions change such that an evaluation is warranted sooner.

Additional Trails
(Letter ID#: 40)

Comment: One respondent wants us to open additional walking and hiking paths (as mentioned in the Draft CCP/EA, under Alternative C, Goal 3) to enhance our public use program.

Response: Alternative C in the Draft CCP/EA, under Goal 3, proposes removing the seasonal access closure out to Ingleside Recreation Area, since under that alternative the habitat along the access road would transition to forest and disturbance to waterfowl would be much less an issue. It also recommends opening up the southern end of the refuge to public access. We wish to point out, however, that the Alternative C discussion was a proposal to "evaluate" opening the southern part of the refuge to public access (re: Goal 3, Subgoal 2, Objective 3.2.1 [Wildlife Observation and Photography]); it was not a commitment to do so should that alternative be selected. We do not recommend these actions because, in our professional judgment, the maintenance and enhancements to our visitor services program that we plan under Alternative B provides the best mix of activities given the resources we expect to have over the next 15 years. In addition, the southern end of the island has been closed to public access for many years due to concerns with disturbing nesting bald eagles and wintering waterfowl, and to protect archeological and cultural resources. Those issues are still relevant, and in fact, our concern with disturbing birds is even more heightened now given the recent Hail Point Cove restoration project, which if successful, will attract even more waterfowl assuming little to no disturbance. As such, we recommend a continued restriction on public access to the southern end of the refuge. As for Ingleside Road, we recommend maintaining the seasonal closure since we will continue to actively manage waterfowl habitat along the access road to provide high quality habitat with minimal disturbance.

Attachment 1—Letter ID Numbers and Respondents

Letter ID Number	Name
1	David Coulter
2	Ducks Unlimited
3	Maryland Waterfowler's Association
4	Cliff and Alicia Brown
5	Phil Poux
6	George Bankey
7	Meg Walkup
8	US Army Corps of Engineers, Baltimore District
9	Charles Evans Jr.
10	Jean Public
11	William Rienhoff III
12	Grenville Whitman - Friends of Eastern Neck, Inc.
13	Dan Gomez
14	Wildlife & Heritage Service, Maryland Department of Natural Resources
15	Farm Bill Coordinator, Maryland Department of Natural Resources
16	Maryland Department of Planning
17	David Foote
18	Brent Prossner
19	William Grenke
20	Jeff Plummer
21	David Butler
22	Paul Bramble
23	Cory Evans
24	Alice Macnow
25	Joseph Lutzel
26	Michael Golob
27	Peter Ogden
28	Brian Kiefat
29	Terry Willis

Letter ID Number	Name
30	Anonymous
31	Erik Gregg
32	Marty Vandegrift
33	Anne Orthner
34	Jeremy Gray
35	Alec Boil
36	Wayne Armacost, Sr.
37	Mark Blazejak
38	Defenders of Wildlife
39	Jack Foehrenbach
40	Kathleen O'Connor
41	Chip Heaps
42	Bobby Clark, Jr.

Appendix I

Jonathan Priday/USFWS

Sunrise along the refuge shoreline

Finding of No Significant Impact

Finding of No Significant Impact

Eastern Neck National Wildlife Refuge
Comprehensive Conservation Plan

In September 2009, the U.S. Fish and Wildlife Service (Service) published the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Eastern Neck National Wildlife Refuge (refuge). This 2,286 acre island-refuge is located in Kent County, Maryland in the town of Rock Hall on the upper Eastern Shore of the Chesapeake Bay. It lies at the confluence of the Chester River and the Bay. Eastern Neck Refuge is part of the Chesapeake Marshlands National Wildlife Refuge Complex (Refuge Complex), which also includes the Susquehanna, Martin, and Blackwater refuges. The Eastern Neck Refuge Draft CCP/EA identifies the refuge's purposes, proposes a vision statement, and includes management goals and objectives to be achieved through plan implementation. The Draft CCP/EA evaluates three alternatives for managing the refuge over the next 15 years and compares their potential contribution to the refuge's purposes, vision, goals, and the mission of the National Wildlife Refuge System (Refuge System). Alternative B is identified as the Service-preferred alternative. Chapter 3 in the draft plan details the respective goals, objectives, and strategies for each of the three alternatives. Chapter 4 describes the predicted direct, indirect, and cumulative impacts on the environment from implementing each alternative. The draft plan's appendixes provide additional information supporting the assessment and specific proposals in Alternative B. A brief overview of each alternative as it was presented in the draft CCP/EA follows.

Alternative A (Current Management): The Council of Environmental Quality regulations on implementing the National Environmental Policy Act (NEPA) require this "No Action" alternative, which we define as current management. Alternative A includes our existing programs and activities and serves as the baseline against which to compare the other alternatives. Under Alternative A, our highest priority would continue to be shoreline and tidal marsh protection and restoration. We would continue to work with partners to maintain 6,066 linear feet of off-shore breakwaters and 2,627 linear feet of on-shore armoring, as well as continue native marsh grass plantings. These activities benefit fish, shellfish, and waterfowl species of conservation concern. Under Alternative A, we would also continue to manage approximately 557 acres of the refuge in croplands to benefit wintering waterfowl. Other activities to benefit wintering waterfowl include management of three moist soil units (MSUs) and five green tree reservoirs (GTRs), and seasonal public access closures in certain areas to minimize disturbance. Public access closures on the south end of the island would also continue to minimize disturbance to nesting bald eagles. Invasive species control would continue across all refuge habitats, as funding permits. We would also maintain our current level of effort in conducting baseline inventories and monitoring which is focused on bird use and evaluating our invasive plant control.

Our visitor facilities and programs would continue at present levels, whereby we offer opportunities for all six priority recreational uses of the Refuge System for approximately 55,000 visitors annually. We would continue to offer deer and youth turkey hunting, recreational fishing and crabbing, on-and off-site interpretation and environmental education

programs, and wildlife observation and photography opportunities. Staffing would remain at three Refuge Complex positions assigned to the refuge, with the expectation that all other Refuge Complex staff would be shared as needed. Administrative facilities, including the historic hunting lodge which houses our refuge office, visitor contact facility, and the Friends of Eastern Neck bookstore, would be maintained.

Alternative B (the Service-preferred alternative): This alternative includes an array of management actions that, in our professional judgment, work best toward achieving the purposes of the refuge, our vision and goals for those lands, the Refuge System mission, and the goals in State and regional conservation plans. Under Alternative B, our highest priority would continue to be the protection and restoration of the refuge shoreline and tidal marsh habitat. Our next highest priority is the management of other refuge wetlands and uplands primarily to benefit migratory waterfowl of conservation concern in the Chesapeake Bay area. With our partners, we would expand our current shoreline protection program to include an additional 25,000 linear feet along the southern boundary of the refuge. Specific design proposals on new shoreline protection projects would be pursued with State and Federal partners upon CCP approval. In conjunction with these new projects, increased submerged aquatic vegetation and tidal marsh restoration would occur on an estimated additional 108 acres benefiting fish, shellfish, and migratory waterfowl of conservation concern, including the rare tundra swan. Under Alternative B, we would maintain the most productive croplands on approximately 372 acres, and convert 185 acres of less productive cropland to forest. We would enhance the management of our existing 5 GTRs and 3 MSUs, and create 4 new MSUs on approximately 22 acres to increase quality habitat for a broad array of wintering waterfowl, shorebird, and marsh and wading birds.

We would increase the amount of mature deciduous-mixed forest on the refuge to 885 acres by converting croplands to increase resting, migrating, and wintering habitat for forest-dependent migratory birds and for nesting bald eagles. We would also actively manage forest habitat to diversify the canopy structure, reduce exotic and invasive plants, and decrease forest fragmentation. Our entire biological inventorying and monitoring program would also be improved by working with partners to prioritize needs, obtain funding and support, and assist with evaluations.

We propose to enhance, but not expand, visitor opportunities for all six priority uses of the Refuge System by upgrading the visitor services professional staff position. The main focus of our visitor services program would continue to be wildlife observation and photography. We would continue to offer high-quality deer hunting, youth turkey hunting, and recreational crabbing and fishing opportunities. Our environmental education offerings would be augmented by volunteer-led programs and increased involvement with the Kent County School District, while interpretative programs would benefit from the development of new brochures and materials on historic and cultural resources. Administrative facilities would continue to be maintained and existing volunteer and seasonal housing would be improved. We would seek funding for two additional Refuge Complex staff positions to be assigned to the refuge, and the upgrading of another, to help plan and implement new and on-going management activities. Also under Alternative B, our protection, education and outreach

programs for archeological and culture resources would be bolstered through partnerships, additional staffing and law enforcement, surveying, and interpretation.

Alternative C: Similar to Alternative B, Alternative C's highest priority is to protect and restore an additional 25,000 linear feet of refuge shoreline and restore submerged aquatic vegetation and tidal marsh on an estimated 108 acres. It is distinguished from Alternative B, however, by its focus on forest management and natural succession on the refuge uplands. Under Alternative C, we would eliminate the refuge's cropland program and manage those acres to contribute to a diverse and healthy mixed deciduous forest. Active management could include tree plantings, thinnings or other forest silvicultural practices as warranted, and invasive and exotic plant control. The existing GTRs and two largest MSUs would be maintained as long as annual evaluations determine they contribute to the biological diversity of the forest.

Unlike Alternatives A and B, Alternative C proposes to expand our public use programs. Wildlife observation and photography opportunities would increase through year-round access to the refuge's Ingleside Recreational Area, an extension to the Tundra Swan Boardwalk, and with the potential for a trail and car-top boat launch on the southern portion of the refuge. This latter opportunity would be determined after a more detailed cultural and biological field evaluation identifies no potential for impacts. Our current hunting program would be expanded as well to include an all-age turkey hunt. Environmental education programs would be increased to include teacher workshops and adult environmental education programs. Additional signage and expanded infrastructure would further enhance interpretation on the refuge. Administrative facilities and staffing increases would be the same as those proposed under Alternative B. In addition, we would enhance our archeological and historical resource protection, education and outreach through partnerships and additional staffing, similar to Alternative B.

We distributed the Draft CCP/EA for a 52-day period of public review and comment from September 9 to October 30, 2009. We received 42 responses representing individuals, organizations, and state agencies. Appendix H in the final CCP includes a summary of those comments, our responses to them, and additional rationale for the changes we make in the final CCP outlined below.

After reviewing the proposed management actions, and considering all public comments and our responses to them, I have determined that the analysis in the draft CCP/EA is sufficient to support my findings. I am selecting Alternative B, as presented in the Draft CCP/EA with the following changes recommended by the planning team, to implement as the final CCP. Changes made to Alternative B in the final CCP are:

- We will create 3 new moist soil units (MSU's) totaling 22 acres, instead of 4 as proposed in the Draft CCP/EA. We re-evaluated our plans in the field with Service and MD DNR biologists and determined that it was more efficient, effective, and beneficial to waterfowl to create 3 larger units in areas we intend to maintain as cropland, instead of 4 smaller units where 2 of those units lie in forest habitat. Map 4.1 in the final CCP depicts the new MSU locations.

- We will reduce the acres in cropland from the existing 557 to 403 acres, which results in a 154-acre (or 28%) reduction. The Draft CCP/EA proposed a reduction from 557 to 372 acres, which results in a 185-acre (or 33%) reduction. The 31 acres difference includes fields we plan to maintain in cropland based on a field evaluation by Service and MD DNR waterfowl experts. Those experts recommend we continue to manage as croplands since additional data and observations indicate the fields receive higher waterfowl use than was our original understanding, and because their location adjacent to public access roads will facilitate wildlife observation and photography.

- We will maintain two hedgerows that were planned for removal in the Draft CCP/EA based on a field review that determined they contribute to wildlife habitat diversity, facilitate wildlife observation and photography because of their proximity to public access roads, and minimize soil erosion from wind and storm events in adjacent croplands.

- Our plans to retain certain hedgerows and croplands, as noted above, caused us to reevaluate the Draft CCP/EA proposal to move the refuge headquarters road. The hedgerows and croplands referred to lie near the headquarters road, and the resulting configuration does not warrant a change in road location. This point, coupled with public concern about the expense of moving the road, justify dropping those plans from the final CCP.

- We will increase the shoreline and tidal marsh protection program described in Draft CCP/EA to include an additional 3,000 linear feet and adjacent marsh along the northern boundary of the refuge. We decided to include this area because it shoreline erosion and tidal marsh loss has accelerated in recent years. We believe this addition, while not included in the Draft CCP/EA, is not a substantial change from the shoreline restoration projects planned in Alternative B in the draft document. As stipulated in both the Draft CCP/EA and the final CCP, all new shoreline protection projects will require additional environmental analysis, documentation, and public involvement to fulfill NEPA requirements.

- We will modify the aggressive *Phragmites* control efforts described in the Draft CCP/EA. There are certain areas where the loss of refuge shoreline is accelerating and the only protection is the presence of *Phragmites* which helps dissipate the erosive force of wind and wave action. In short, removal of *Phragmites* would result in open water and no shoreline protection. Until we can establish native vegetation or other natural barriers to those impacts, we will scale back our *Phragmites* control efforts in certain high risk areas.

I concur that modified Alternative B, including the above changes, helps fulfill the mission of the Refuge System; best achieves the refuge's purposes, vision, and goals; maintains and, where appropriate, helps restores the refuge's ecological integrity; addresses the major issues identified during the planning process; and is consistent with the principles of sound fish and wildlife management. Specifically, in comparison to the other two alternatives, modified Alternative B promotes the greatest diversity of habitat types for migratory birds, especially waterfowl, through its combination of forest, wetland, cropland and grassland management. It also provides

the most reasonable and effective enhancements to existing public use programs that are in high demand, with minimal impacts to wildlife and habitats. The plans to increase staffing and improve infrastructure are reasonable, practicable and will result in the most efficient management of the refuge and best serve the American public. This Finding of No Significant impact includes the EA by reference.

I have reviewed the predicted beneficial and adverse impacts associated with Alternative B that are presented in Chapter 4 of the Draft CCP/EA, and compared them to the other alternatives. I specifically reviewed the context and intensity of those predicted impacts over the short and long-term, and considered their cumulative effects. I have also determined that the proposed changes to Alternative B described are within the scope and scale of the alternatives analysis conducted in the draft CCP/EA and no additional analysis is needed. My evaluation concludes that implementing modified Alternative B will not result in any concerns with public health or safety, nor result in adverse implications to any unique cultural or natural characteristics of the geographic area, including wetlands or Federal-listed species. I find that implementing modified Alternative B adheres to all legal mandates and Service policies, and will not have a significant impact on the quality of the human environment, in accordance with Section 102(2)(c) of NEPA. Therefore, I conclude that an Environmental Impact Statement is not required, and this Finding of No Significant Impact is appropriate and warranted.

James H. Lange — 3/26/10

Marvin E. Moriarty — Date

Acting Regional Director
U.S. Fish and Wildlife Service
Hadley, Massachusetts

Eastern Neck National Wildlife Refuge
1730 Eastern Neck Road
Rock Hall, MD 21661
410/639 7056
410/639 2516 FAX
easternneck@fws.gov
http://www.fws.gov/Refuges/profiles/index.cfm?id=51590

Federal Relay Service
for the deaf and hard-of-hearing
1 800/877 8339

U.S. Fish & Wildlife Service
http://www.fws.gov

For Refuge Information
1 800/344 WILD

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